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ABSTRACT

The practicum described in this report was intended to develop an effective computer-based procedure for allocating teaching personnel among the 94 elementary schools in the Denver Public School System. The project design was developed by the authors over a 10-month period in cooperation with central office administrators and 12 elementary principals. Recommendations on appropriate variables to be included in designing the computer process were gathered through a districtwide survey of elementary principals. Field testing was hypothetical; various combinations of variables were used to determine differing teacher allocations, which were then compared with existing teacher allocations in every school. The finished allocation procedure developed through this process will be fully implemented in Denver's elementary schools for the 1976-77 school year. (Author/JG)

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FEB 2 1976

EQUITABLE AND EFFICIENT STAFFING OF ELEMENTARY SCHOOLS IN THE DENVER PUBLIC SCHOOLS SYSTEM

by Frank E. Roberts and Orville D. Turner

Submitted in partial fulfillment of the requirements for the degree of Doctor of Education, Nova University

Denver Cluster
Dr. Harold A. Stetzler

Maxi I Practicum Report
November 1975

EA 003 056

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- Mrs. Viola Hall, Secretary, for her outstanding clerical assistance.

- All elementary principals of the Denver Public Schools, especially the twelve volunteers, for their many ideas, suggestions, and hours of involvement in the project.

ABSTRACT

The purpose of this practicum is to develop an effective computer-assisted procedure whereby the directors in the Department of Elementary Education can equitably and efficiently allocate teaching personnel to the ninety-four elementary schools in the district.

The procedure was developed by the practitioners working cooperatively with twelve volunteer elementary principals selected to assist with the refinement of the staffing procedure and the Department of Education and Management Information Systems.

The outcome of these efforts has brought about a workable and acceptable operating procedure. Full implementation and use of the procedure will occur during February 1976, the preliminary staffing period for the 1976-1977 school year.

Personnel in twenty-three large school districts have expressed an interest in this project. Their interest suggests that this procedure may fulfill a need in other districts in our nation.

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DEFINITION OF TERMS

Achievement in Basic Subjects - the gradation of academic achievement reported in grade level equivalency.

Adequacy of School Plant - a classification of adequacy based on a rating as determined by the Department of Facility Planning of the Denver Public Schools.

Base Class Size - the district pupil-teacher ratio obtained by dividing the district pupil membership, grades 1-6, by the total number of teacher allocations for grades 1-6, excluding physical education teachers and IMC (library) personnel. This base class size may be adjusted due to the effect the factors of impaction, mobility, and busing have in determining the staffing needs of specific schools. Once a base class size has been determined that utilizes all staff allocations, no school's pupil-teacher ratio will exceed this number.

Cluster - five to six elementary schools whose boundaries are contiguous and in which a common communication's network has been established.

Competency of Staff - an overall assessment of the total staff based on the teacher appraisal process and the validation of future salary increases as supported by Article 23 of the "Agreement between Denver Classroom Teachers Association and School District #1."

Computer-Assisted - the application of prescribed data to a developed computer program to provide a precise analysis of the data as treated by a mathematical formula.

Comparability - a federal law that requires each local educational agency to provide data that substantiate that educational services being provided by the local funds in a Title I project school shall be comparable to the services provided with such funds in schools not served under Title I of the Act. This includes the full-time equivalent number of certified and uncertified instructional staff members who are paid with state or local funds regularly assigned to such public school or schools.

Court-ordered Desegregated Schools by -

Pairing - assignment of pupils from a majority Anglo school to a minority Black or Hispano school, and vice versa, on a part-time basis. The pupils spend a minimum of one-half of each school day, plus the lunch period, in an integrated setting in

the assigned paired school. Generally, each paired school transports one-half of the pupils in grades four, five, and six for integrated instruction during the morning hours. Primary pupils in grades one, two, and three are transported for integrated instruction in the afternoon. Schools on the pairing plan alternate transported groups on a nine-week or an eighteen-week (semester) basis or an equivalent of one-half the school year.

The elementary paired school plan was developed as a part of the total desegregation plan ordered for the Denver Public Schools by the United States District Court in April 1974; thirty-seven of the ninety-four elementary schools are paired.

Rezoning - establishing new boundaries for schools to provide a greater ethnic representation in the student body.

Short Busing - transporting pupils for a short travel time (five to twenty minutes) from a satellite area to another school to improve integration.

Long Busing - transporting pupils from satellite areas for integration purposes where the transportation is considered to be of an extended duration (twenty to thirty minutes).

Cultural Deprivation - those aspects of middle-class culture - such as education, books, formal language, etc. - from which some groups and individuals have not had the opportunity to benefit.

District Index - a number representing the sum of the district's median number of pupils on Aid for Families of Dependent Children (AFDC), the district median of pupil mobility for a specified period of time, and the district median number of pupils transported to school for any reason. (In early runs a numerical constant was added to the district index to represent the effect of the pairing factor; in later runs the pairing factor was not included in the district index to represent the effect of the pairing factor; in still later runs the pairing factor was excluded.) The district index number varies, depending upon the weight assigned each of the above factors.

Economic Impaction - a condition for eligibility, as defined in ESEA Title I guidelines, for entitlement to ESEA Title I programs based on the number of families in the school receiving AFDC and/or on General Welfare. As determined by the Department of Federal Projects of the Denver Public Schools, forty-six Denver elementary schools are economically impacted.

Elementary Principals' Advisory Committee - a group composed of principal representatives from eighteen cluster areas, each representing the five to six elementary school principals in the cluster.

EMIS - Education and Management Information Systems, a department in the Division of General Administration, Denver Public Schools.

Enrollment - the number of pupils enrolled in grades one through six in accordance with the official data prescribed each year by state regulations.

Mobility - the number of original pupil registrations and withdrawals from a school's membership during a specified period of time.

Original Pupil Registrations - the cumulative number of pupils enrolling in a school for the first time during the course of one school year.

Satellite Area - a court-designed area noncontiguous to a school but assigned to a particular school to improve racial balance. In the Denver schools, these areas usually are populated by minority pupils who are assigned and transported to a majority school.

School Index - the number representing the sum of the pupils whose families are on AFDC, pupils who entered or withdrew from the school during a specified period of time, and pupils bused to the school for any reason. (In early runs, a numerical constant was added to the school's index number if the school was paired with another school for the purpose of integration; in later runs the pairing factor was not included in the index.) The index number of a school varies, depending on the weight given each of the above factors.

Transportation - the total number of pupils transported to a school per United States District Court Order.

Teacher Allocation - numbers of teachers assigned to various grades or positions in elementary schools by the Department of Elementary Education. Present allocations are based on a subjective basis with size of school enrollment the main factor. Future allocations will be based on need factors of mobility, economic impaction, and busing.

Equitable and Efficient Staffing of Elementary Schools in the Denver Public Schools System

by Frank E. Roberts and Orville D. Turner[1]

INTRODUCTION

The Department of Elementary Education of the Denver Public Schools is charged with the responsibility of staffing with teachers each of the ninety-four elementary schools, using a process that is prudent, efficient, and equitable. Based on personal experiences and professional preparation, each of the executive directors shares this responsibility within the department and attempts to be prudent, efficient, and equitable; however, the current system of allocating teachers is such that the directors tend to be influenced by subjective conditions.

Historically, administrators have allocated teachers according to a need based on class size and a ratio of pupils to

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[1]Frank E. Roberts and Orville D. Turner are Assistant Executive Directors of Elementary Education in the Denver Public Schools, Denver, Colorado.

assigned teachers. While the process has been in practice in the Denver Public Schools for a number of years, there are now harsh reminders from the public of the need for the Department of Elementary Education to be more objective and to assure the various publics of the sincere intention to implement a system of allocations which is, in fact, equitable and efficient.

The practitioners have defined a more objective process designed to provide the number of teachers needed to meet effectively the educational needs in each of the ninety-four schools administered by eighty-four principals.

The project design was developed by the practitioners over a period of ten months during which they worked cooperatively with other central office administrators and school principals. Support from principals was solicited by the practicum partners according to a planned set of strategies.

Principals were invited to indicate an interest if they felt the project held promise. Each of the eighty-four principals was given the opportunity to provide input for the project through a district-wide survey. The survey raised questions concerning the appropriate variables which should be considered when developing a measure for individual school staffing needs.

A number of variables, resulting specifically from the assessment of school needs, were considered in the design of the computer process. The variables reflected many concerns expressed by principals who attempted to describe school needs which could affect the allocation of teachers to be assigned to their schools. Typical of the variables cited by principals were mobility, enrollment, economic impact, academic achievement, physical plant, court-ordered integration plans, and number of pupils transported to school as a result of the court-ordered plans.

The practitioners worked with the assistance of an assigned research analyst and twelve principals who volunteered because they were interested in staffing procedures. With the input of the principals, and the aid of the researcher, the practitioners experimented with the effect each variable had when included in a mathematical formula. Field testing was hypothetical; various combinations of variables were used to determine differing teacher allocations which were then compared with existing teacher allocations in every school. (Appendix A)

THE PROBLEM

The City and County of Denver, with a population of 540,000 persons, covers an area of approximately one hundred square miles (Appendix B). Currently, there are 33,655 pupils in grades one through six in the ninety-four elementary schools. For the purpose of this project, the number of teachers has been limited to the 1,271 teachers directly assigned to classrooms in grades one through six in ninety-four elementary schools that are administered by eighty-four principals. The Department of Elementary Education consists of an assistant superintendent and three assistant executive directors. Each director is responsible for an assigned number of schools (Appendix C) with whom he works directly on many matters - one of which is staffing each school.

Traditionally, the staffing of elementary schools has been accomplished by the directors using an unstructured criterion judgment of school needs; school enrollment has been the primary criterion. This staffing process has involved the directors in the Department of Elementary Education and the principals who work toward an agreeable staffing arrangement for each school.

Regardless of the best efforts, once the school year is under way, it very often happens that schools with similar needs are not staffed on an equal basis. Unfortunately, some schools are overstaffed and some understaffed. Following the opening of each school year in September, adjustments become difficult to make. There are many problems related to making last minute adjustments in staffing, such as shifting classes of students, reduction in numbers and reassignment of teachers, interruption of instructional programs, and the necessity to maintain credibility with parents when adjustments must be made.

There are often circumstances relating to a school's staffing pattern that make it necessary for the directors to maintain a limited number of unassigned allocations that allow for unexpected contingencies. The department must exercise careful budgetary control and management of teacher allocations in order to be in a position to meet the needs of schools which, for various reasons, become understaffed during the school year.

Due to these reasons, the practitioners have proposed the use of a staffing process which would be objective and responsive to the educational needs of each individual school.

NEED FOR CHANGE

The Denver Public School system has experienced a declining school population of approximately 11,000 pupils in grades one through six during the period between 1968 to 1975, or approximately twenty-two percent of the elementary age population, (Figure 1). As indicated in Figure 2, the increase of births during the period of 1966-1969 should have been an offsetting factor; however, during this period of time, 1971-1974, the effects of the increase in births from 1966-1969 was not realized in the school population.

In keeping with required fiscal management, the Departments of Elementary and Secondary Education have been requested by the Board of Education to reduce teaching personnel at a rate of one teacher for each fifty pupils lost each year. The decline in teaching personnel is illustrated in Figure 3. It is anticipated that the rate of loss for September 1976 will be approximately 1,650 pupils, which will require a reduction of thirty-five teaching positions among ninety-four elementary schools.

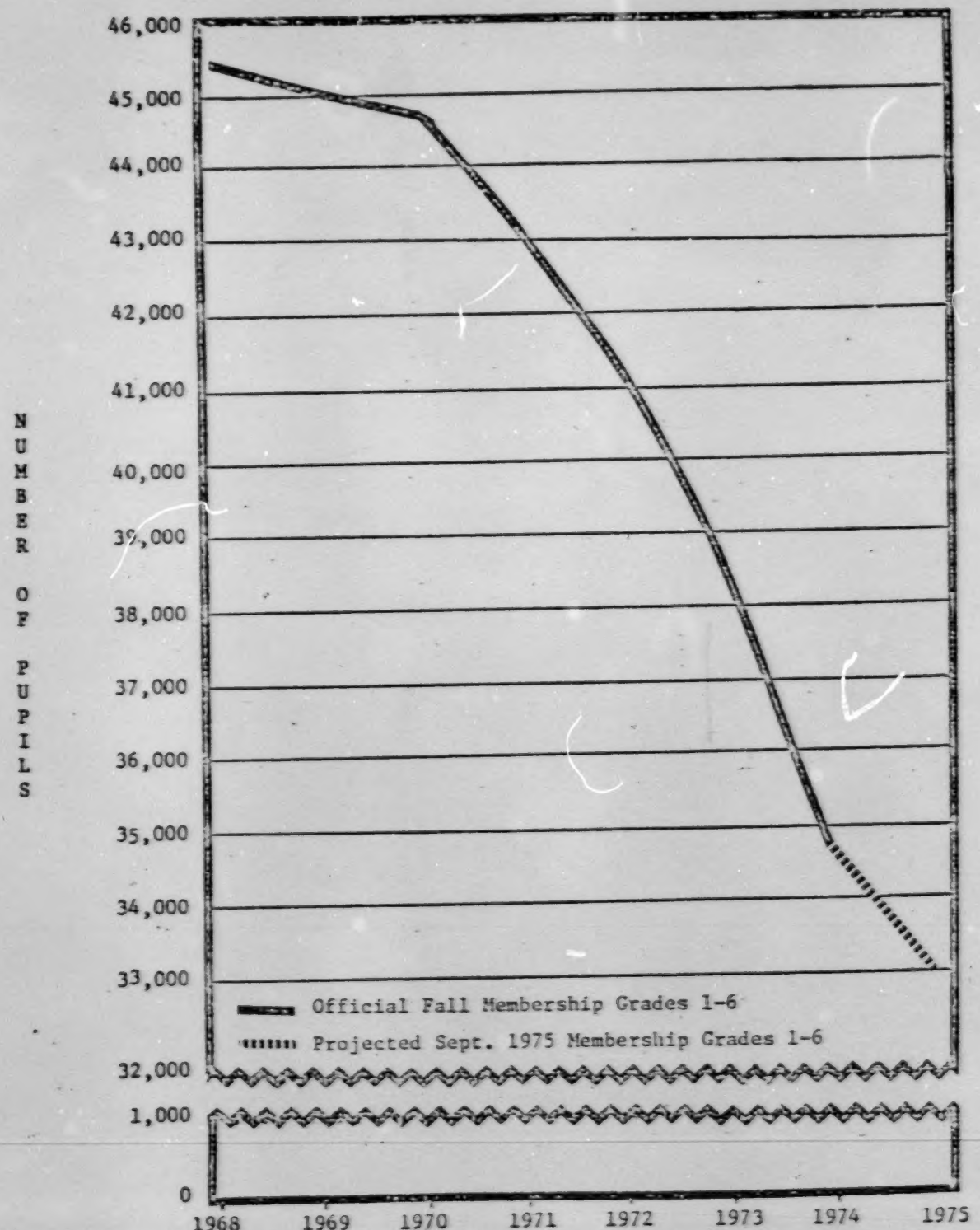
The procedure for adding staff in times of population growth is a pleasant task for department directors, because faculties and administrators value the flexible scheduling and enhanced teaching

opportunities that generally result. The procedure for reducing staff generally has a negative impact because opportunities diminish and program flexibility is decreased. Faced with these reductions, and faced with critical staff members and concerned parents in any affected school, the personnel of the Department of Elementary Education attempt to be fair in making reductions; they strive to defend such reductions.

Experience shows that an objective rationale to support reductions has not existed; discussion and reasoning are the prevailing strategies. An inability to work with objective procedures has often led to inequities and unjustifiable staffing procedures. Thus, the practitioners were challenged by a need to develop an objective process that will demonstrate equity and efficiency in the assignment of teacher allocations to each of the ninety-four schools.

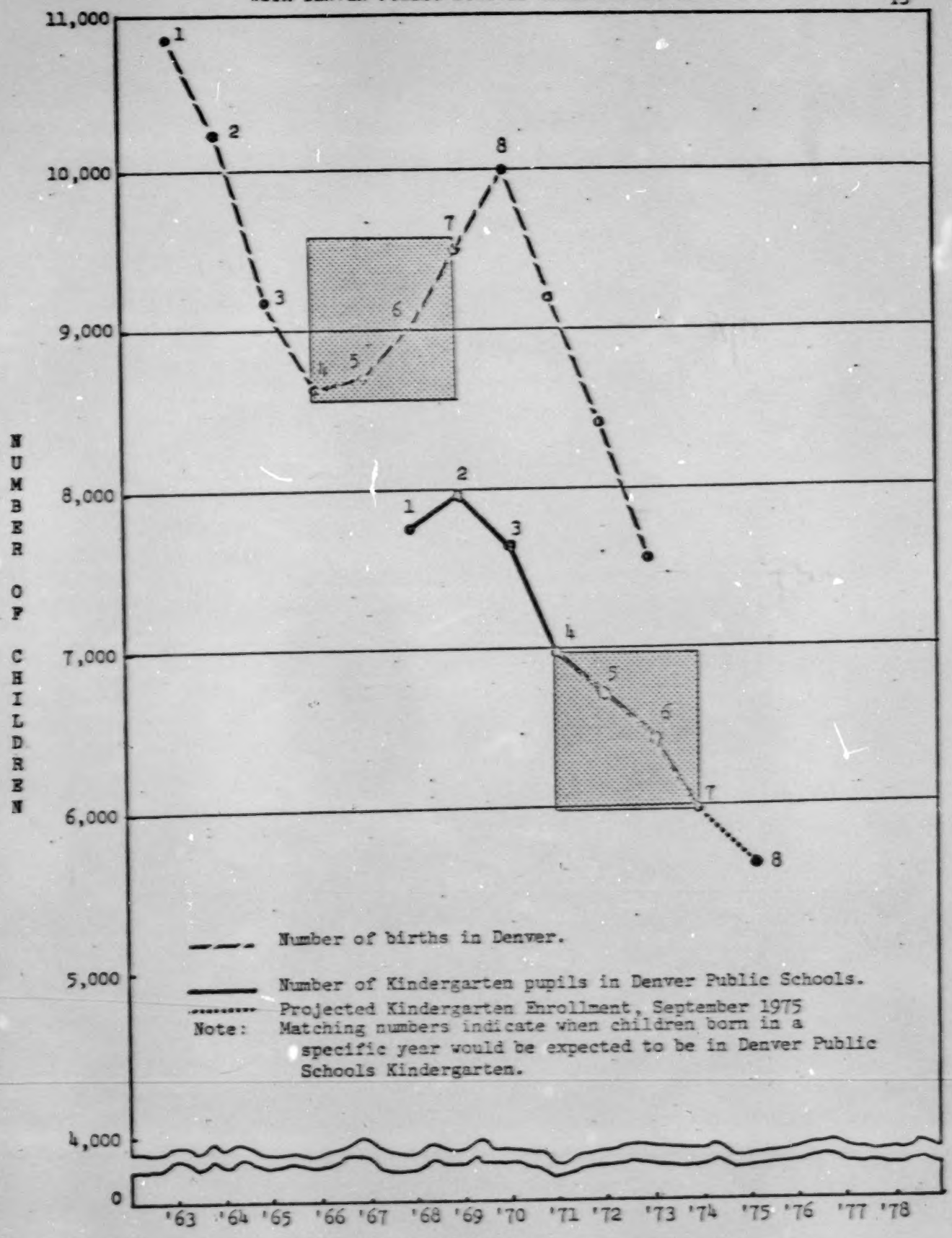
Figure 1

DENVER PUBLIC SCHOOLS
ELEMENTARY ENROLLMENT GRADES 1-6
September 1968 - September 1975 (Projected)



March 1975
Department of Education and Management Information Systems

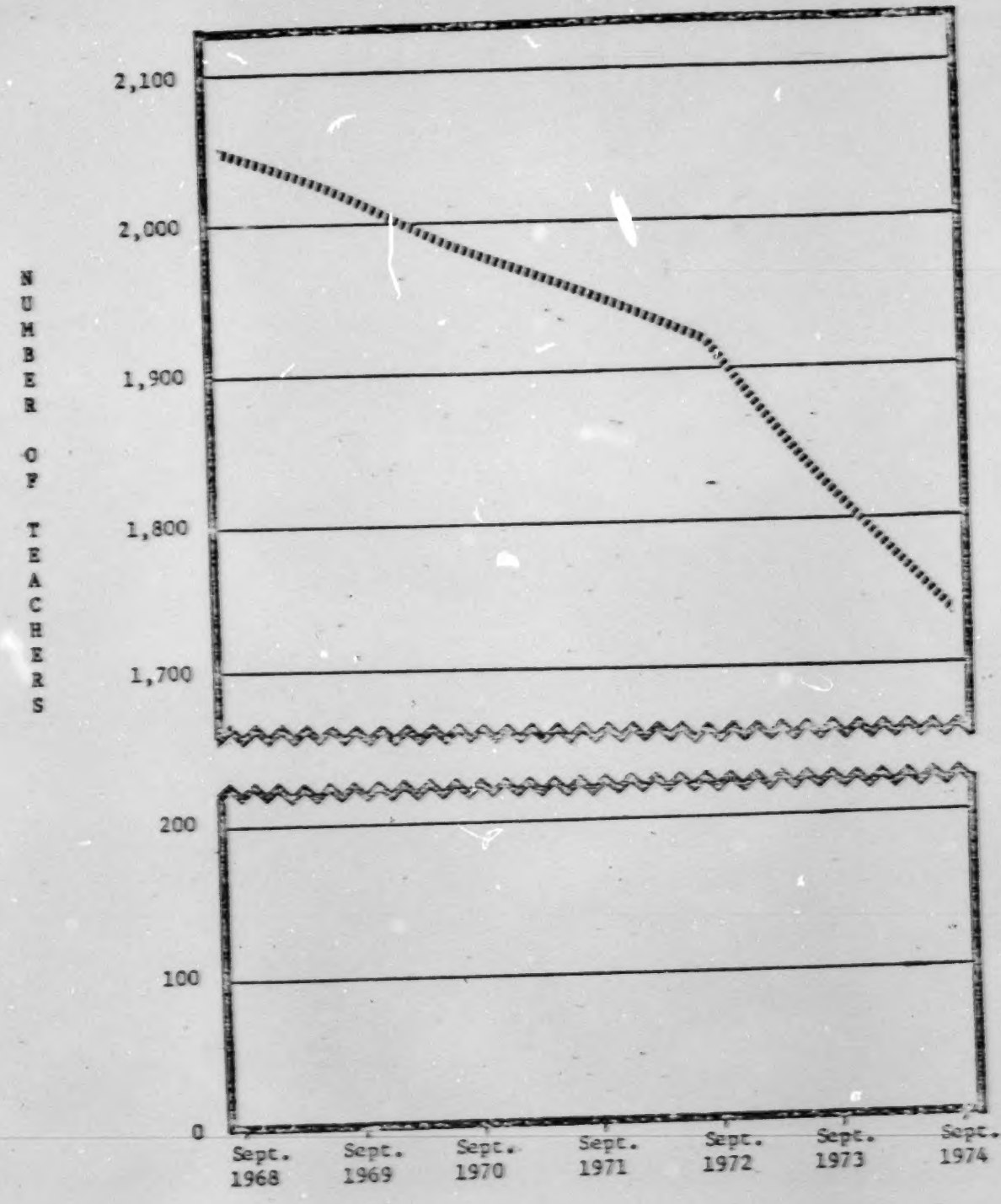
Figure 2 COMPARISON OF BIRTHS IN DENVER WITH DENVER PUBLIC SCHOOLS KINDERGARTEN ENROLLMENT


11,000
10,000
9,000
8,000
7,000
6,000
5,000
4,000
0
NUMBER OF CHILDREN
'63 '64 '65 '66 '67 '68 '69 '70 '71 '72 '73 '74 '75 '76 '77 '78
Number of births in Denver.
Number of Kindergarten pupils in Denver Public Schools.
Projected Kindergarten Enrollment, September 1975
Note: Matching numbers indicate when children born in a specific year would be expected to be in Denver Public Schools Kindergarten.

Sources: Bureau of Vital Statistics
Denver Public Schools Membership Reports

Figure 3

DENVER PUBLIC SCHOOLS
NUMBER OF ELEMENTARY TEACHERS - GRADES K-6



March 1975
Department of Education and Management Information Systems

SUMMARY OF PRACTICUM PROCEDURES

The new staffing procedure described in this practicum was developed to help alleviate frustrations experienced by personnel in the Department of Elementary Education, including the authors who are responsible for staffing Denver Public Schools elementary schools. Over a period of years, these persons had been unable to respond adequately to staffing requests and inquiries because of the absence of district guidelines or criteria.

Principals, parents, and teachers were concerned because their subjective evaluations indicated that some schools appeared to be overstaffed while others seemed to be staffed inadequately. These concerns attracted the attention of elementary education administrators.

The assistant executive directors responsible for staffing elementary schools realized that changes were needed. Consequently, the two practitioners considered a study of the problem timely, as a Nova requirement and as a potential contribution to more effective elementary school administration.

Subsequently, the following steps were taken or planned by the two practitioners:

January

The practitioners explored the nature of the problem and discussed the development of a practicum that would be helpful to the department in staffing the elementary schools. The practicum concept was reviewed with and approved by the assistant superintendent for elementary education.

A meeting of the practitioners and the executive director of the computer department (the Department of Education and Management Systems) was held to consider the potential values of the project. The consensus was that the project had merit, and it was decided that a computerized systems approach to staffing seemed feasible. The director of EMIS assigned a research analyst to assist the practitioners with a computer program and test runs of variable data selected by the practitioners.

A practitioner review of the literature and a telephone survey of Denver metropolitan school districts indicated that no other school system had undertaken a comparable study of school staffing.

February

A meeting was held with the assistant superintendent and departmental directors to obtain their approval before beginning

the practicum; the project was approved. At this point, initial responsibilities were divided as follows:

Practitioner*	Practitioner
Orville Turner	Frank Roberts
. Worked with John Temple, research analyst, to determine variables to be submitted to principals for their consideration.	. Conducted a meeting with randomly selected principals to elicit preliminary responses.
. Developed first questionnaire designed to obtain information to be used in determining staffing procedures.	. Reviewed and planned steps for use of questionnaire; planned collection and analysis of questionnaires.

March

The practitioners jointly introduced the proposed project to the Elementary Principals' Advisory Committee, a group of eighteen principals representing the district's eighty-four elementary school administrators. The nature of the project was discussed, anticipated outcomes were explained, and questions were answered. The responses

*Respective responsibilities of the team members will be indicated in this manner throughout this document.

were positive and questionnaires were distributed by the practitioners to those attending in order that principal representatives could distribute them to each of the principals they represented.

The respondents returned completed questionnaires to the practitioners who organized and analyzed the data and prepared a list of principals who had volunteered to continue to cooperate in the study. A meeting with the research analyst was held to consider:

- suggested variables
- projected population
- verified staff statistics
- identified problems.

The practitioners prepared a progress report for the principals' advisory group and planned to meet with the twelve principals who had volunteered to participate in the practicum.

April

Orville Turner

- Reported for the first time to the volunteer principals' group and noted suggestions from principals.

Frank Roberts

- Reported progress to principals' advisory group and noted concerns of participants who then met with respective cluster principals.

The team members shared views of the participating groups of principals and made plans for subsequent steps with the cooperation of the research analyst.

May

Frank Roberts

- Reported progress to principals' advisory group.

The team met with the volunteer principals to review variables, trial runs, and possible staffing procedures. The next step was a meeting with all district principals to report progress. Progress checks and modifications were discussed frequently with John Temple.

June-August

Activities slowed during the summer months. The practitioners were occupied with departmental meetings, trial runs, and writing plans during these months.

September

The practitioners, in concert with the research analyst, determined the final variables and planned staffing computer runs. The results were then reported to the volunteer principals.

An abbreviated questionnaire was designed by the team.

Orville Turner

- Conducted a meeting with the volunteer principals for the purpose of reviewing progress and disseminating the questionnaire. Mr. Temple assisted by discussing the technical aspects of the computer programming.

- Principals were asked to complete the survey instrument and to return it to Orville Turner or Frank Roberts by school mail.

October

Responses were received by the practitioners who compiled the data, including comments. Working cooperatively throughout October, the practitioners planned the writing of the practicum and then worked individually on respective writing tasks. When the separate writing tasks were completed, they were synthesized cooperatively.

December

Frank E. Roberts

. Reported progress to principals' advisory group in order for them to refer the information to their constituents.

January 1976

In the forthcoming month, both practitioners are planning to meet with all district principals to discuss a final plan and to describe an implementation procedure. The eighty-four principals will be met in four separate groups that include their four respective directors and the assistant superintendent for elementary education.

February

Implementation of the plan is to begin this month. The Department of Education and Management Information Systems will have projected population data for each school by this time and the practitioners will, according to the formula, specify the appropriate number of teachers to be assigned to each school; elementary education directors will convey this information to school principals. Director-practitioner-principal conferences

will be used to determine staffing additions or reductions. Upon completion of these steps, it will be necessary for the practitioners to work with members of the personnel department in making plans for job postings, transfers, and other personnel procedures. These matters must be completed before the closing of schools in June 1976.

September 1976

The practitioners will employ supplemental computer runs to obtain revised pupil population data that will permit any final staffing adjustments for the 1976-1977 school year.

RATIONALE AND DESIGN OF STAFFING PROCESS

Rationale

The revised staffing process model developed by the practitioners appears to hold much promise for the Department of Elementary Education. There are several obvious reasons for the attachment of value to the process, such as:

(1) The educational needs of individual schools are recognized and objectively treated.

(2) The directors responsible for allocating staff to schools will have an objective rationale for their actions.

(3) School principals will be able to report to the various publics a specific process which results in an equitable and efficient allocation of teachers.

Consumer Resistance Anticipated

(1) Some principals might be critical of the process because it requires a change from the traditional allocation process.

(2) Some principals might be threatened by the loss of excess teacher allocations achieved because the previous traditional process allowed subjective variations.

(3) The principals might not feel a sense of involvement in the process and, consequently, might not have a sense of commitment.

The practitioners developed strategies for establishing a communications network among the eighty-four principals and planned to obtain principals' input and direct involvement throughout. (Appendix D)

Introduction of Conceptual Model to the Elementary Principals' Advisory Committee to the Administrative Staff

In order to disseminate the initial ideas and to develop an awareness of the staffing problem among principals, it was decided that the eighteen-member principals' advisory committee, (Appendix E) would provide an appropriate forum for the initial discussion. The committee convenes monthly to discuss items directly related to the daily operation of the elementary schools. Each committee member represents five or six principals who work in a common geographical cluster assignment (Appendix F). The cluster group meets monthly to discuss the events of the general meeting and to suggest agenda items for the subsequent meeting. Thus, this committee constitutes a district-wide communication network which involves all principals on a monthly basis.

On March 6, 1975, the practitioners presented the conceptual model to the Elementary Principals' Advisory Committee. The eighteen-member committee was given the opportunity to ask questions and to criticize the concept of the proposed staffing process. Each committee member was asked to discuss the concept with cluster members and to provide each principal with a copy of the instrument which had been designed to gather data from the eighty-four

principals (Appendix G). Further, the practitioners asked the committee representatives to solicit the names of principals who might be interested in becoming directly involved with the development and field testing of the process.

Participating Volunteer Principals

The two practitioners developed a communications network through the voluntary assistance of twelve principals who were interested in the staffing project. The twelve schools represented a cross section of schools with regard to these significant factors:

- school enrollment
- socioeconomic level
- ethnic composition
- court-ordered relationships (involving seven models).

This group of principals agreed to participate with the practitioners in a series of activities intended to lead to the final development and refinement of the innovative staffing process. The initial plans for school staffing would, by design, be hypothetical. This step was necessary in order to field-test the process and evaluate the effectiveness prior to

implementation on a district-wide basis. The reality test and evaluation will come in September 1976, after measuring the impact of the initial process to be implemented for the first time in February 1976. In early February, principals and directors will be planning school-by-school teacher allocations for September 1976.

Survey of Denver Elementary School Principals

Each elementary principal was requested to consider the possible variables which could be used in calculating the teacher allocations; each principal indicated a preferred criteria for allocating teachers to each school. The variables could be treated by the practicum team as measures of educational need, expressed for each school. At the outset, there were several variables suggested to stimulate reactions from principals (Appendix G).

Results of the Survey

The results of the survey of principals provided a substantial number of variables. There was sufficient agreement among the principals to encourage the practitioners to pursue a preliminary analysis, using seven variables:

- pupil mobility
- school enrollment

- economic impaction*
- achievement in basic subjects
- adequacy of school plant
- pairing of schools for court-ordered integration
- number of pupils transported to and from the school

Some variables suggested by principals for consideration were:

- competency of staff
- cultural deprivation of pupils
- number of original pupil registrations during a given school year

Survey of Thirty-three Large City School Systems

A survey instrument was developed by the practitioners and used in a search for relevant data which would be helpful in developing and refining the proposed staffing process. Twenty-two school districts of thirty-three (66 percent) responded to the survey (Appendix H).

Results of the Survey

The general results of the survey were disappointing to the practitioners as none of the respondents had used an objective-based formula process of allocating teachers.

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* As defined in ESEA Title I Guidelines.

including computer programming. However, the rating applied by the respondents to each of the suggested variables was of substantial assistance to the practitioners in validating the ratings originally assigned to variables by principals in the Denver schools. The principals placed greatest value on the following:

- economic impaction
- school enrollment
- level of academic achievement.

Other Contacts - National and Regional

During the developmental process, the practitioners held informal discussions with directors from other large school districts attending the national convention of the Association for Supervision and Curriculum Development in New Orleans in March 1975, and at the Nova University 1975 Summer Institute. Directors interviewed represented school districts in New Orleans, Dallas, Miami, Chicago, Fort Lauderdale, and Portland.

The practitioners also discussed staffing with directors of large school districts in Colorado, including Colorado

Springs, Jefferson County R-1, Littleton, and Englewood. The practitioners did not find a computerized process, nor a process similar to the one developed in this project, existing in any district.

Variables

All variables suggested by personnel of the twenty-two large school systems and the Denver elementary school principals were weighed and then placed into the computer bank to determine if such variables made a significant difference in school staffing.

In addition, all staffing numbers resulting from computer runs were compared with existing staffing numbers to determine comparisons between the computer plans and the present method being used. The practitioners assumed that any procedure that was radically different or extremely innovative would not be highly regarded nor accepted by school principals.

In order to have the project accepted, two things were immediately apparent to the practitioners:

(1) that a reasonable and equitable average class size should be used as a standard for each school, and

(2) that any deviation from the base allocation in each school would be an addition to staff, but never a reduction.

The paired-school variable first considered for inclusion was removed because this variable favored only thirty-seven of the schools presently receiving additional personnel. Subsequently, on August 11, 1975, the United States Tenth Circuit Court of Appeals indicated that pairing, as carried out in the Denver schools, was not constitutionally acceptable and must be changed to full-time integration activities. This court direction assured the need to drop this variable from further consideration.

After studying the trial runs, consulting with the program analyst, and discussing matters with the volunteer principals, the practitioners agreed that three variables should be used in determining staff allocations in each school. These were:

- mobility
- economic impaction
- transportation.

Used in the computer runs, these variables indicated desirable results when compared to present staffing allocations; specific variables were applied to all schools in the district.

Formula Derivation

The basic staffing formula is:

$$D = I + M + B + C$$

where:

- D is the district elementary staffing index number based on the identified variables.
- I (economic impaction factor) is the district median number of pupils whose families are on Aid to Families with Dependent Children as determined by the Department of Federal Projects, using ESEA Title I guidelines applicable as of July 1974.
- M is the district median mobility index for all elementary schools for the runs reported, using the data for October, November, December, and January of the 1974-1975 school year.
- B is the district median of all pupils eligible to be transported to elementary schools, for the runs reported, using data for the 1974-1975

school year as provided by the Department of Transportation, Denver Public Schools.

- C is a numerical factor of 32 which is included in the district index to represent the variable of pairing for integration as ordered by the Federal District Court. The index of each school participating in the pairing program is increased by 81, whereas, the indices of schools not participating in the pairing program are not increased. The constant factor of 81 was calculated by taking one-third of the sum of the district medians for mobility, economic impaction, and transportation, which was 243. The constant factor of 32 for the district index was obtained by taking four-tenths of 81, since only four-tenths of the elementary schools in Denver participate in the pairing program.

Thus the basic formula for computing the elementary staffing index number for each individual school is:

$$D(K) = I(K) + M(K) + B(K) + C(K)$$

where:

- D(K) is the index number calculated for an individual school (K)

- I(K) is the number of pupils at school (K) whose families are on Aid to Families with Dependent Children as reported by the Denver Public Schools Department of Transportation.

- C(K) is the pairing for integration factor. If a school (K) participates in the pairing program, the elementary staffing index number for that school is increased by 81 as described above. If a school (K) does not participate in the pairing program, the index number for that school is not increased.

The district index D and the index D(K) can be altered in the basic formulas ($D = I + M + B + C$ and $D(K) = I(K) + M(K) + B(K) + C(K)$ by varying the weight given each factor in the formula. For example:

$D = I + M + B/2$ and $D(K) = I(K) + M(K) + B(K)/2$

indicates that the transportation variable has only one-half the weight that it had in the original formulas above and the variable of pairing has been eliminated from the formulas.

In the runs that were made, based on actual membership data on September 10, 1975, the pairing variable was not included in the staffing index formula for the following reasons:

(1) In previous runs the pairing factor, as presently considered in the formula, did not appear to have significant influence on the results.

(2) Prior to the opening of schools in September 1975, the United States Tenth Circuit Court of Appeals ruled that part-time pairing of elementary schools ". . . is not constitutionally acceptable for desegregation purposes."

Hence, in the future, the factor of pairing will not be considered in the determination of staffing needs.

Computer Program Development and Application

In the early stages of development, the use of school enrollment as one of the several factors was inequitable because it tended to allocate additional staff members to schools on the basis that schools were large while schools that were small were penalized. Thus, it took increasingly weighted variables to offset the membership factor for small schools. Consequently,

school enrollment was considered apart from other variables and was not used in the calculation of a district index or an individual school index number.

School enrollment was considered in this fashion:

1. Projected total district elementary enrollment for 1975 was calculated by taking 95 percent of the November 1, 1974, membership. The 95 percent factor was used because early elementary enrollment projection figures of 1975 generally indicated a pupil enrollment decrease of approximately 5 percent. Enrollment as of November 1, 1974 was used as a base because, statistically, November 1 is considered to be a more accurate enrollment date - more typical of the entire year than any other date.

2. Projected enrollment estimates are made each February for the succeeding school year that begins in September.

3. Based on the projected enrollments for 1975 and earlier staff allocations as budgeted, a base class size was determined for each school.

4. A base class size based upon enrollment was then divided into projected 1975 enrollment per school to determine the number of classroom teachers needed in grades one through six.

The practitioners considered other variables in the determination of a district index number and individual school index numbers described in the basic formula.

It was necessary to develop a potential maximum index number any school could have by considering the greatest number of transported, economically deprived, and mobile students. The range between the average district index number and the potential maximum individual school index number was arbitrarily divided into four sub-ranges by the researcher. If a school's index number varied above the district index number by an amount within the first sub-range, an additional 0.5 teacher allocation was added to the basic number of teachers, determined by the population factor, described above. For example, let's assume a city-wide index of 243 was determined based on factors of mobility, economic impaction, and numbers of students transported. To determine the upper limit of an index figure, a maximum number of pupils relating to each of the above factors was determined. In the example, this maximum potential index number was 1,021. The range between the district index of 243 and 1,021 was 778. This range of 778 was further subdivided into four quarter ranges of 194.5. Thus, if a school had an index number between 243 and 437.5, it would be assigned by the Department of Elementary Education an additional 0.5 teacher allocation. If a school's index

number was between 437.5 and 632, it would be assigned by the department an additional 1.0 teacher allocation. If a school's index number was between 632 and 862.5, it would be assigned by the department an additional 1.5 teacher allocation. If a school index number was between 826.5 and 1,021, it would be assigned by the department an additional 2.0 teacher allocation. Any school at the district index number of 243 or below would be allocated by the department according to the predetermined base number of classroom teachers (grades one through six) as the formula would dictate, based on total teacher allocations and projected pupil enrollment.

Initial Variable Factors

The practitioners asked for a number of trial runs, using the factors suggested by Denver's principals and the respondents to the large city school survey (Appendices G and H). Examination of the computer run results indicated that some of the variables appeared to have little significance in the determination of staffing needs. These were discarded.

Access to a portable terminal, the Texas Instrument Silent 700, connected via telephone to the Denver Public Schools Univac 1106 computer center facilitated rapid analyses of runs. In the future, once school data are stored in the program, a

complete run, with necessary changes in the basic formula for all ninety-four elementary schools, can be made in less than one hour.

Final Variable Factors

At the conclusion of the experimental period, it was decided that the variables to be used would be economic impaction, mobility, and number of pupils transported to a school. More experimentation was conducted varying the weight of each of the factors. For example, runs were made where:

$$D(K) = I(K) + M(K) + B(K)$$

$$D(K) = I(K) + M(K) + B(K)/2$$

$$D(K) = 21(K) + B(K)$$

$$D(K) = 21(K) + M(K) + B(K)$$

When relatively stabilized enrollment data for 1975 were available (mid-September), computer runs were made using these formulas (Appendix I). Results were compared with actual staffing allocations made in February 1975 by the conventional procedures. It was found that the computer formula indicated adequate staffing and inadeqaute staffing (Figures 4, 5, and 6).

The formula, $D(K) = I(K) + M(K) + B(K)/2$, seemed to suggest that it would assure the most equitable allocation of staff for the entire district.

COMPARISON OF 1975-1976 STAFFS (Grades 1-6) AS PROJECTED BY ELEMENTARY EDUCATION DEPARTMENT AND COMPUTER FOR SELECTED SCHOOLS
(Differences In Projected Staff Requirements Of 1.5 Teachers Or More)

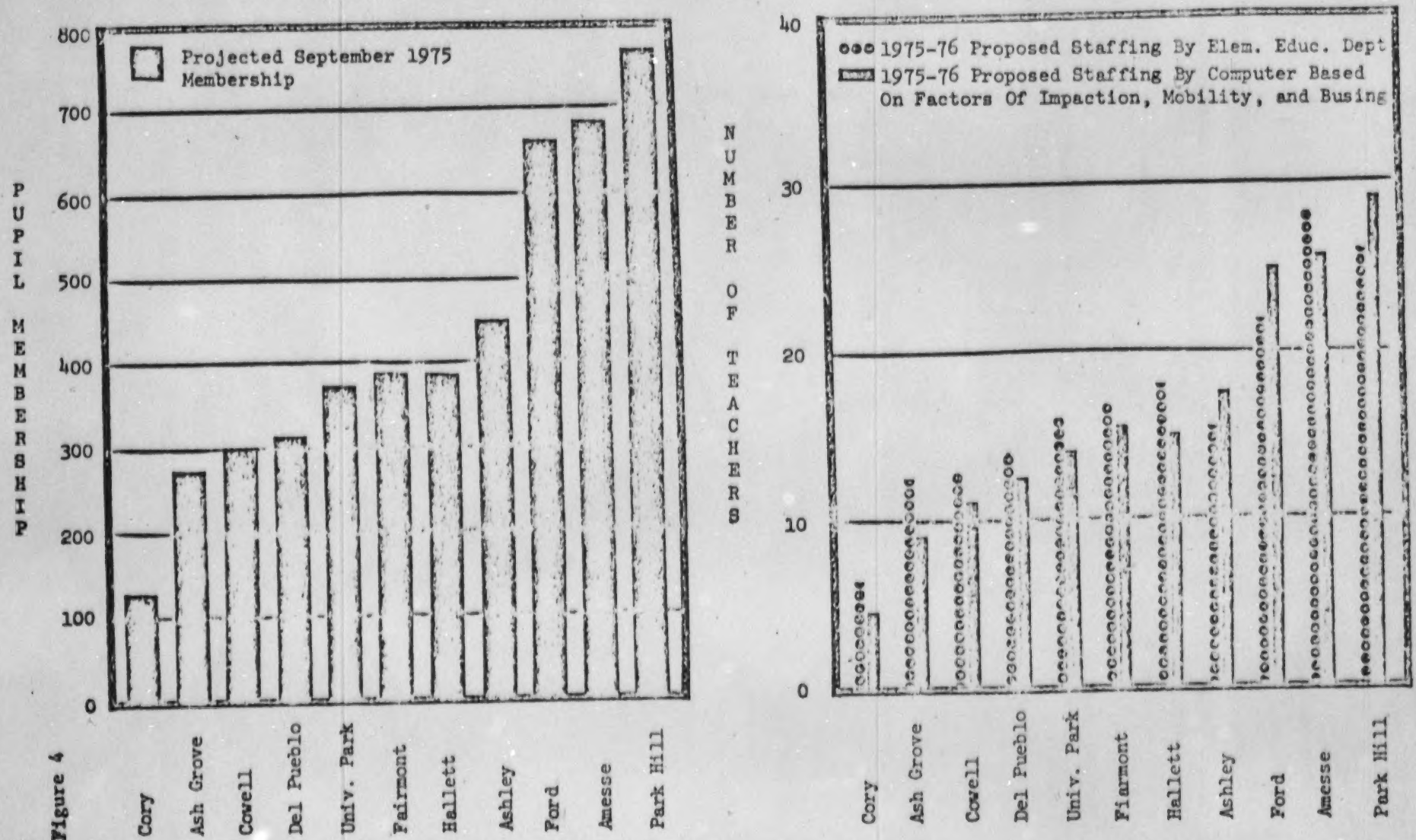


Figure 4

July 1975
Department of Education and Management Information Systems

COMPARISON OF PUPIL MEMBERSHIP AND NUMBER OF TEACHERS

Eleven Selected Schools of Comparable Enrollment
Grades 1 - 6

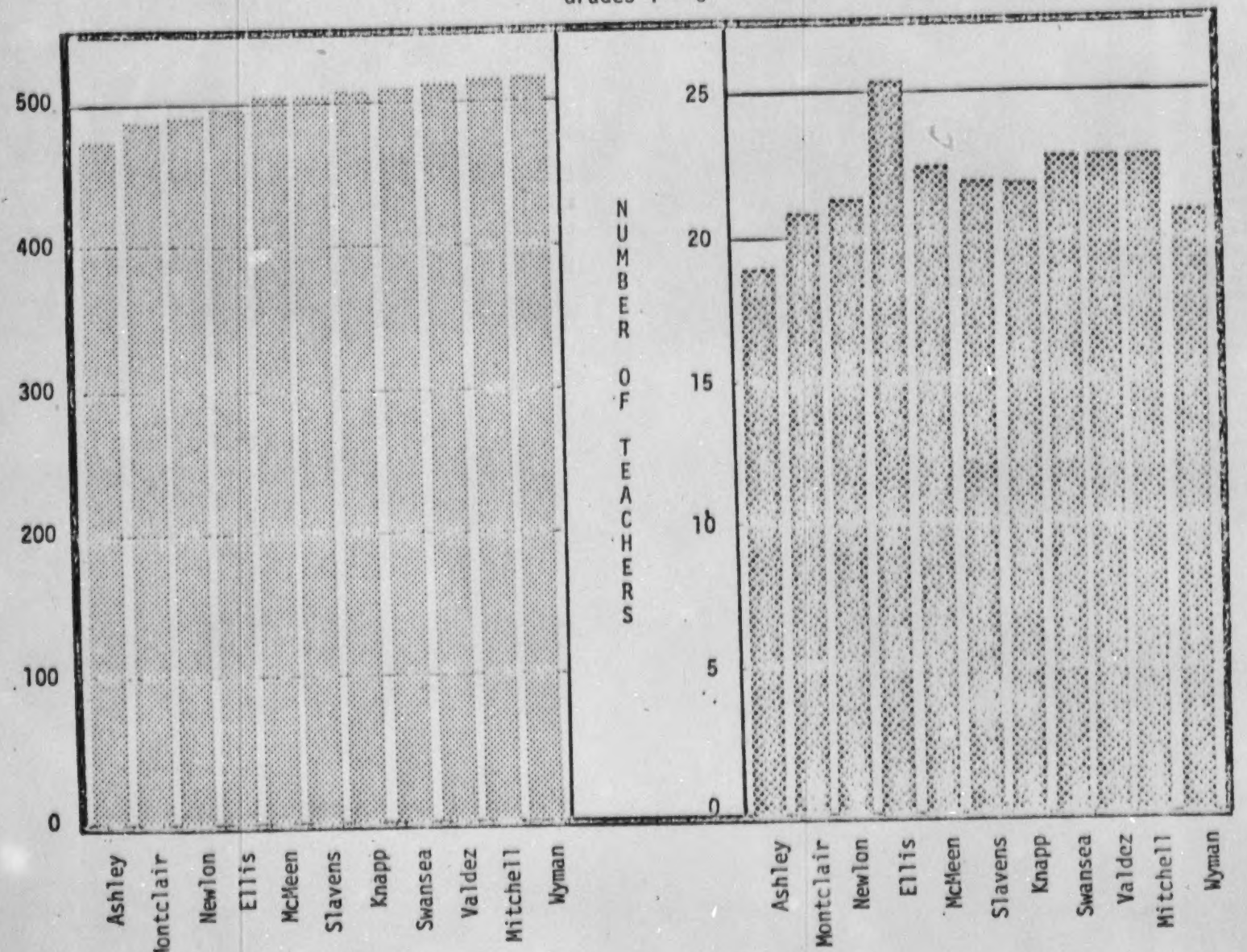


Figure 5

April 1975
Department of Education and Management Information Systems

DENVER PUBLIC SCHOOLS

COMPARISON OF PUPIL MEMBERSHIP AND NUMBER OF TEACHERS

Twelve Selected Schools of Comparable Enrollment
Grades 1 - 6

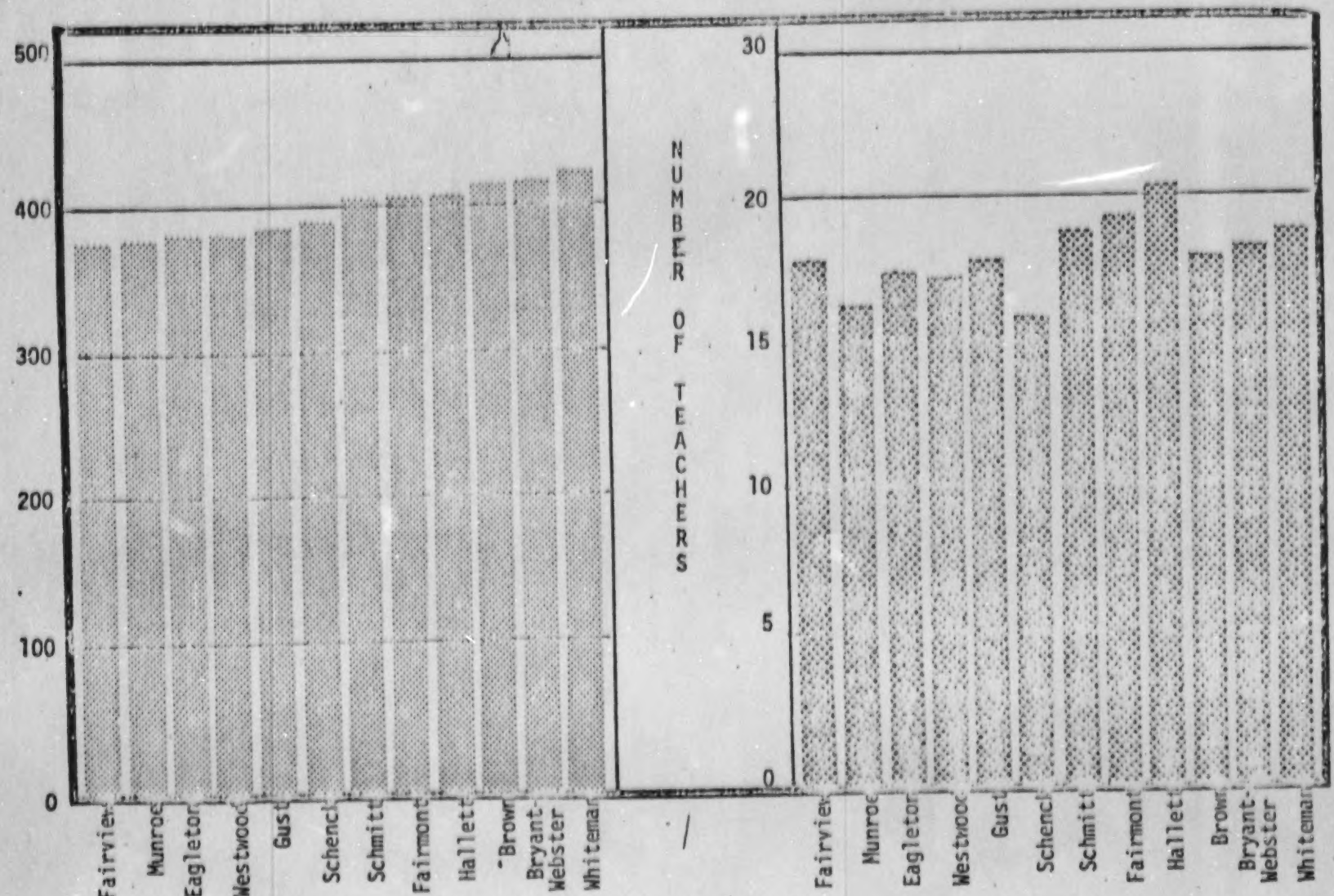


Figure 6

April 1975
Department of Education and Management Information Systems

JUSTIFICATION FOR SELECTING THIS SOLUTION PROCEDURE

In surveys and three discussion sessions conducted by the practitioners with the twelve volunteer principals and in four presentations and discussion sessions with the principals' advisory committee, it was determined that the project had merit and should become the new staffing procedure for 1976.

The solid support of school principals who studied the staffing plan was related to a realization that each school would receive equal consideration for staffing based upon objective criteria. This, obviously, was the primary factor among school administrators who were concerned with identifiable school needs.

It must be realized that this project was not designed as a money-saving procedure. It was designed to determine fairly and equitably within the parameters of the adopted budget, total staff allocations to each school. Population projections prior to staff assignments determine total teacher allocations for the Department of Elementary Education. The proposed procedure, it is felt, by the Department of Elementary Education and principals, will be a more effective instrument for delivering staff allocations.

The twelve principals responding to interviews and the questionnaires (Appendix J) supported the proposed process of staffing schools that employed computer procedures. While all

twelve principals supported the total concept overtly, they returned to their individual buildings to complete the questionnaire and only nine questionnaires were returned. Support from principals has been generated because the process, according to their comments, demonstrates that schools will be staffed upon bases that surpass means previously employed.

Project evaluations made by the practitioners indicated a need to give further attention to the staffing of special subject areas, such as instructional materials centers, music, and art. According to the cooperating principals, this staffing process is an appropriate advancement in the staffing of schools. It is apparent that the practitioners will have access to and the support of principals to initiate logical steps toward an equitable staffing of each school.

PRELIMINARY ANALYSIS OF COMPUTER-ASSISTED PROCEDURE

The question has been raised: Does the computer-assisted method provide a fair, equitable, and reasonable staffing base for all schools? The data obtained in this practicum clearly demonstrates that this method will provide a fair, equitable, and reasonable staffing base for all schools.

Inasmuch as the procedure will not be implemented until February 1976 to assist in the staffing of all elementary schools, a complete answer to the above question is not possible at this time. However, this one example indicates that if the procedure had been implemented and followed for all of the elementary schools in September 1975, some of the current problems relating to comparability and the distribution of Federal Title I funds in target schools might have been avoided.

A recent audit by the staff of the Department of Federal Projects revealed a number of inequities relating to the comparability of staffs among target area and non-target area schools. A list of twenty-five non-target area schools was provided the Department of Elementary Education. These are schools that are to be considered immediately for possible reductions in staff to meet the federal comparability requirements relating to Title I

funds. Personnel available from these staff reductions in non-target area schools are to be assigned to Title I target area schools. Schools on the list (Table 1) designated by an (*) are schools where definite reductions must be made.

Table 1 displays the following information:

1. Column I - Schools to be considered for staff reductions resulting from an audit by the Department of Federal Projects.

2. Column II - The number of classroom teachers (grades 1-6) tentatively assigned to the schools by the elementary education administrative staff for September 1975, after conferences with the principal during the spring of 1975.

3. Column III - During the spring and summer of 1975, ten preliminary runs for the ninety-four elementary schools were made. These runs were based on projected teacher allocations ranging from 1,271 to 1,292. Various factors and weights of factors were used

in these runs (Appendix I). Column III provides the range of teacher allocations, grades 1-6, for each of the twenty-five schools resulting from the ten preliminary computer program runs.

4. Column IV - Teacher allocations, grades 1-6, designated by a computer run based on actual September 10, 1975, membership and 1,249 teacher allocations, not including physical education teachers and IMC personnel. (D = I + M + B/2).

5. Column V - Number of teachers (grades 1-6, not including physical education and IMC) actually assigned to each school on September 26, 1975.

Data from the table indicate that, based on ten preliminary runs, perhaps nine to twenty teacher reductions in the twenty-five schools should have been made prior to the opening of school in September. The run, based on actual September 10, 1975 membership and 1,249 teacher allocations, indicates that up to forty-seven teacher reductions could have been considered after the tentative assignments made in the spring. Column V reveals that only 9.5 teacher reductions were made in these twenty-five schools in question between the spring of 1975 and late September 1975.

Additional schools were added by the practitioners for further consideration of staff reductions if computer runs indicated these schools should receive attention. Of the schools added, ten in all, the computer run indicated that seven of the ten should receive attention and be reduced by one full teacher, or more. One school, Bradley, had been reduced by one teacher following a careful analysis and review of the staffing prior to October 1, 1975. This computer run indicates a need to now increase Bradley school by two teacher allocations.

This evidence seems to indicate that the computer-assisted procedure will objectively assist the Department of Elementary Education in overcoming the district staffing inequities which occur through the subjective p ocedures currently used by the administrators in the Department of Elementary Education.

TABLE 1

STAFFING COMPARISONS

Column I School	Column II Teachers Assigned by Elem. Educ. Staff for September 1975 (Spring 1975)	Column III Range of Teacher Allocations from 10 Preliminary Runs Based on Projected Membership	Column IV Teacher Allocations Run Based on September 10, 1975 Membership and 1,249 Teacher Allocations	Column V Actual Teachers Sept. 26, 1975
Alcott	13.5	13.0 to 13.5	13.0	13.5
*Ash Grove	12.5	8.5 to 9.0	9.0	11.5
*Asbury	8.5	8.5	7.0	8.5
Bradley	28.0	28.0 to 29.0	27.0	25.0
Bromwell	10.5	10.0 to 10.5	10.0	10.5
*Carson	13.5	11.5	11.5	13.5
*Cory	6.5	4.5 to 5.5	4.5	6.5
*Denison	9.0	8.0 to 8.5	6.5	8.0
*Doull	14.0	13.0 to 13.5	11.5	14.0
Ellis	17.0	18.0 to 19.0	15.5	17.0
*Fallis	9.0	8.0 to 8.5	8.0	9.0
Force	16.0	15.5 to 16.0	14.5	16.0
Ford	22.0	25.0 to 25.5	21.0	22.0
*Johnson	12.5	12.0	9.5	12.5

TABLE 1 (continued)

STAFFING COMPARISONS (continued)

Column I School	Column II Teachers Assigned by Elem. Educ. Staff for September 1975 (Spring 1975)	Column III Range of Teacher Allocations from 10 Preliminary Runs Based on Projected Membership	Volumn IV Teacher Allocations Run Based on September 10, 1975 Membership and 1,249 Teacher Allocations	Column V Actual Teachers Sept. 26, 1975
Kaiser	27.5	27.5 to 28.0	24.5	28.0
*McKinley	6.25	5.0	4.5	6.25
*McMeen	19.0	18.0 to 18.5	16.5	18.0
Sabin	28.0	24.0 to 24.5	23.5	25.0
*Steele	7.5	6.0	4.5	6.5
Teller	10.0	10.0 to 10.5	11.0	10.0
*Traylor	20.0	20.0 to 20.5	16.5	19.5
*University Park	16.0	13.0 to 14.0	12.5	15.0
*Washington Park	11.5	10.0 to 10.5	8.0	10.0
Whiteman	15.0	15.5 to 16.0	16.5	18.0
TOTALS	353.25	332.5 to 344.0	306.5	343.75

*Schools where definite reductions in staff will be required for comparability by Department of Federal Projects. Other schools to be considered for possible teacher reduction, if so indicated on computer runs, were added to the list by the practitioners.

DISCUSSION

Because teacher salaries constitute 70 to 80 percent of school budgets, and are rising each year, each school district must strive to secure productive optimum results from these employees (Figure 8). A key factor in this process is maximal use of efficient staffing procedures as related to budgeted funds.

The practitioners seem justified in concluding that most school districts follow traditional staffing procedures. This being the case, these practitioners regard their staffing procedures more equitable and efficient per dollar expended. This procedure, confirmed by data, is commended to other school districts with similar problems (Appendix H).

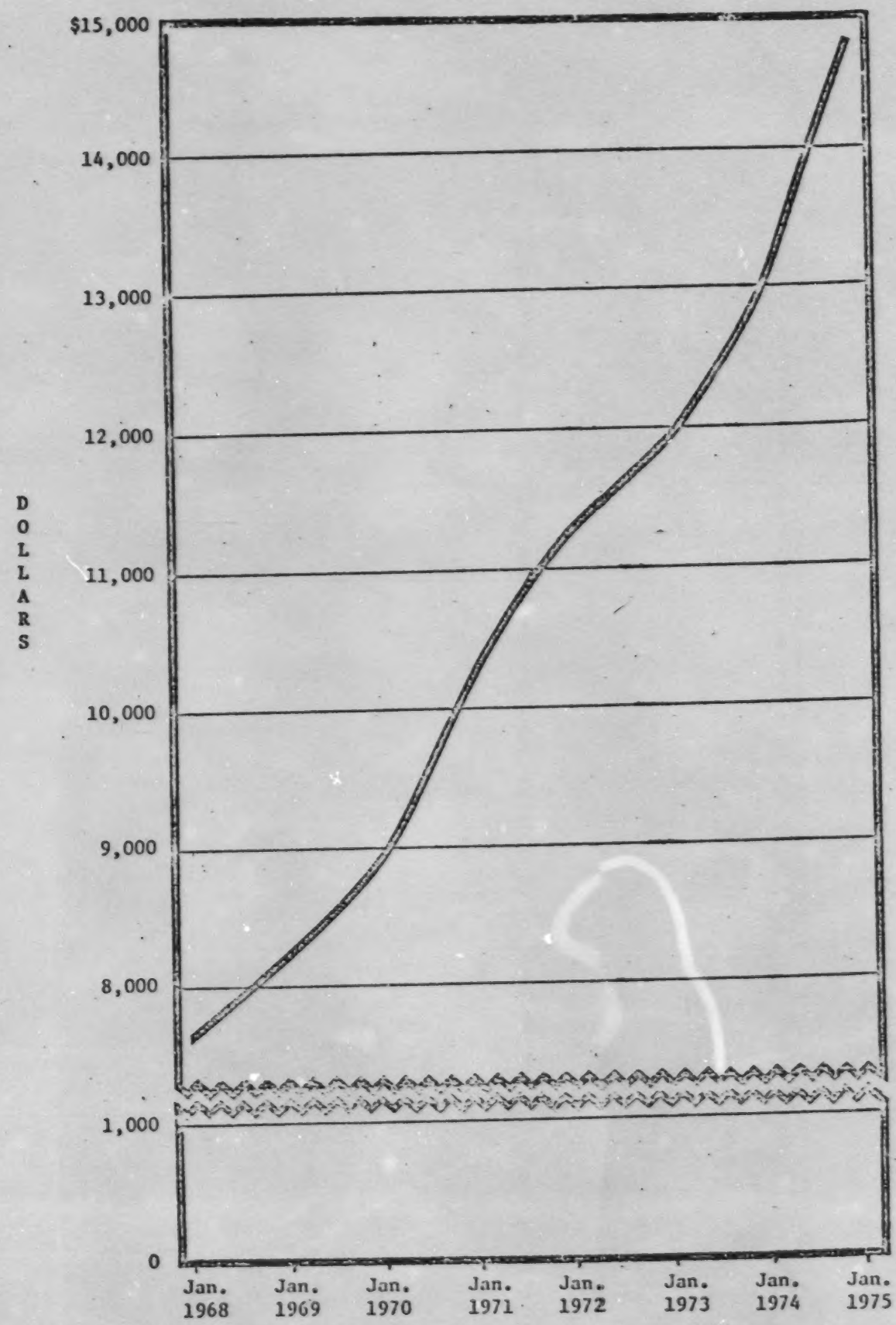
More efficient ways must be developed to assist in the total process of school allocations, i.e., teachers, aides, and clerical staffs. The process for allocating or assigning certificated staff, as described in this practicum, is a step forward.

SUMMARY

The purpose of this practicum was to develop a process to effectively and efficiently improve the staffing of Denver's elementary schools. Several approaches dependent upon selected variables, were considered. From these efforts, four variables were identified as those that would provide improved approaches.

Figure 7

DENVER PUBLIC SCHOOLS
TEACHERS' AVERAGE SALARY
1968-1975



March 1975
Department of Education and Management Information Systems

These were mobility, population, transportation, and economic impaction.

The results were conclusive enough to the researchers and all principals interviewed that agreement upon the process should be adopted because it provides an improved process for staffing Denver schools (Appendix I). This process also may have valuable implications for other districts in our nation if they are searching for means to improve methods of staffing schools.

The assistant superintendent of elementary education reported this practicum at the "Conference on Elementary School Problems in Large Cities" held in Portland, Oregon, November 2-7, 1975.

CONCLUSIONS

After evaluating the results of this practicum, the following conclusions are justified:

1. It is possible to develop a computerized process that can be utilized to equitably and efficiently allocate an elementary school staff.

2. The process provides school principals with an understanding of how each school has been staffed. The process details the major variables which impinge upon instructional programs of the schools.

3. Certain variables, although considered highly important, are not needed in the computer process.

4. The process provides objective criteria for the assignment of staffing allocations.

5. The process can be defended because it provides school administrators with objective factors that affect staff additions or reductions.

6. The process allows the Department of Elementary Education to make staffing changes rapidly and objectively.

7. The process alleviates a concern that parent groups and teachers may have in regard to fairness of teacher allocations from school to school.

8. The process removes the elements of subjectivity, bias, and favoritism.

APPENDIX A

```
NO PROGRAM FILE GIVEN-TPF$ ASSUMED
>OLD:ELSTAFF4T1
ESCBASF4T1    14:57:51    17 OCT 75

00010 ' THIS PROGRAM CALCULATES A MANAGEMENT INDEX NUMBER FOR EACH SCHOO
L'
00020 ' AND INDICATES THE NUMBER OF TEACHERS REQUIRED FOR STAFFING PURPO
SES'
00030 PRINT
00040 PRINT ' TYPE THE TOTAL NUMBER OF PUPILS IN GRADES 1-6 FOR THE DIST
RICT'
00050 INPUT P
00051 PRINT 'TYPE IN THE BASE CLASS SIZE FOR GRADES 1-6'
00052 INPUT C1
00060 PRINT ' TYPE IN THE TOTAL NUMBER OF TEACHING POSITIONS IN THE DIST
RICT'
00061 ' FOR GRADES 1-6'
00062 INPUT T
00063 PRINT 'INDEX D IS BASED ON IMPACTION+MOBILITY +BUSING/2'
00065 PRINT 'RANGE NUMBER 3 MUST BE USED FOR THIS PROGRAM'
00072 PRINT
00073 PRINT
00074 PRINT ' TYPE IN THE NUMBER OF THE RANGE (1,2,3,4) YOU DESIRE TO US
E'
00075 INPUT R1
00079 REM I IS THE DISTRICT AVERAGE IMPACTION FIGURE
00080 LET I=81
00081 REM B IS THE DISTRICT AVERAGE NUMBER OF CHILDREN BUSED TO A SCHOOL
00082 LET B=141
00083 REM P1 IS THE DISTRICT AVERAGE ENROLLMENT FIGURE
00084 LET P1=375
00085 LET C=5
00089 REM M IS THE DISTRICT AVERAGE MOBILITY FIGURE
00090 LET M=50
00091 LET D=250
00100 LET R=P/T
00101 REM C IS THE DESIGNATION OF A PAIRED SCHOOL(1) OR NOT A PAIRED SCH
OOL(0)
00110 PRINT ' TYPE IN THE NUMBER OF SCHOOLS INCLUDED IN THIS RUN'
00120 INPUT N
00121 DIM N$(50),P(50),I(50),M(50),B(50),C(50),D(50),A(50),N(50),R(50),T
(50)
00122 DIM S(50),E(50)
00125 LET T1=0
00127 PRINT'                    PRESENT      NEW        MANAGEMENT PRES NO.    NEW
 NO.'
00129 PRINT'   SCHOOL     P/T RATIO  P/T RATIO     INDEX    TCHR. POS. TCHR
 POS.'
00131 PRINT'-------------------------------------------------------------';
00132 PRINT'--------------'
00133 FOR K=1 TO N STEP 1
00140 READ N$(K),P(K),I(K),M(K),B(K),C(K),T(K)
00141 LET S(K)=.95*P(K)
00142 LET E(K)=S(K)/C1
00150 LET D(K)=I(K)+M(K)+(B(K)/2)+0*C(K)
00160 LET A(K)=P(K)/T(K)
00161 IF R1=1 GO TO 170
00162 IF R1=2 GO TO 203
00163 IF R1=3 GO TO 213
00164 IF R1=4 GO TO 225
00170 IF D(K) <D THEN N(K)=E(K)
```

```
00190 IF D(K) >= D AND D(K)< D+195 THEN N(K)= E(K) + .5
00190 IF D(K)>= D+ 195 AND D(K) < D+390 THEN N(K)=E(K)+1
00200 IF D(K) >= D+390 AND D(K) < D+ 585 THEN N(K)=E(K)+1.5
00201 IF D(K)>= D+ 585 THEN N(K)=E(K)+2
00202 GO TO 237
00203 IF D(K)<D THEN N(K) = E(K)
00204 IF D(K) >= D AND D(K) < D+262 THEN N(K)= E(K)+.5
00205 IF D(K) >= D+262 AND D(K) < D+576 THEN N(K)= E(K)+1
00206 IF D(K)>= D+576 AND D(K)<D+838 THEN N(K)=E(K)+1.5
00207 IF D(K)>=D+838 THEN N(K)=E(K)+2
00212 GO TO 237
00213 IF D(K)<=D THEN N(K)=E(K)
00214 IF D(K)>D AND D(K)<= D+122 THEN N(K)=E(K)+.5
00215 IF D(K)>D+122 AND D(K)<=D+244 THEN N(K)=E(K)+1
00216 IF D(K)>D+244 AND D(K)<=D+366 THEN N(K)=E(K)+1.5
00217 IF D(K)>D+366 THEN N(K)=E(K)+2
00224 GO TO 237
00225 IF D(K)<D THEN N(K)=E(K)
00226 IF D(K)>=D AND D(K)<D+207 THEN N(K)=E(K)+.5
00227 IF D(K)>=D+207 AND D(K)<D+414 THEN N(K)=E(K)+1
00228 IF D(K)>=D+414 AND D(K)<D+614 THEN N(K)=E(K)+1.5
00229 IF D(K)>=D+614 THEN N(K)=E(K)+2
00237 GO TO 238
00238 LET R(K)=D(K)/N(K)
00239 LET T1=T1+N(K)
00240 PRINT " ";NB(K);TAB(12);A(K);TAB(23);R(K);TAB(34);D(K);TAB(44);T(K
);
00241 PRINT TAB(56);N(K)
00250 NEXT K
00251 PRINT " THE NUMBER OF NEEDED TEACHERS IS ";T1
00252 PRINT " THE DISTRICT AVERAGE MANAGEMENT INDEX NUMBER IS ";D
00253 PRINT " THE DISTRICT PUPIL TEACHER AVERAGE IS";R
00260 DATA ALCOTT,365,73,39,184,1,13
00262 DATA AMESSE,722,61,89,34,0,25
00264 DATA ASBURY,236,17,41,119,1,10
00266 DATA ASH GROVE,237,2,28,230,1,12
00268 DATA ASHLEY,474,65,80,134,0,17
00270 DATA BARNUM,305,71,54,16,0,11
00272 DATA BARRETT,301,88,18,230,1,11.5
00274 DATA BEACH CT.,278,30,26,41,0,10
00276 DATA BELMONT,163,35,24,0,0,6
00278 DATA BERKELEY,268,33,42,241,1,10
00280 DATA BOULEVARD,209,96,44,0,0,9.5
00282 DATA BRADLEY,757,75,64,565,0,27
00284 DATA BROMWELL,288,23,21,115,0,11
00286 DATA BROWN,416,148,45,34,0,15
00288 DATA BRYANT WEB.,417,150,28,184,1,15
00290 DATA CARDON,324,21,23,184,0,15.5
00292 DATA CHELTENHAM,622,254,103,0,0,23
00294 DATA COLFAX,285,30,42,0,0,10.5
00296 DATA COL. VIEW,299,65,34,0,0,11
00298 DATA COLUMBIAN,303,85,48,12,0,11.5
00300 DATA COLUMBINE,274,130,15,133,1,11.5
00302 DATA CORY,133,2,13,183,1,6
00304 DATA COWELL,312,62,53,0,0,13
00306 DATA CROFTON,184,121,28,166,1,7.5
00600 END
```

>>

```
OLD:ELSTAFF4T1
>RUN
ELSTAFF4T1   13:20:36   22 OCT 75

 THIS PROGRAM CALCULATES A MANAGEMENT INDEX NUMBER FOR EACH SCHOOL
 AND INDICATES THE NUMBER OF TEACHERS REQUIRED FOR STAFFING PURPOSES

 TYPE THE TOTAL NUMBER OF PUPILS IN GRADES 1-6 FOR THE DISTRICT
? >33311
TYPE IN THE BASE CLASS SIZE FOR GRADES 1-6
? >26.385
 TYPE IN THE TOTAL NUMBER OF TEACHING POSITIONS IN THE DISTRICT
 FOR GRADES 1-6
? >1271
INDEX 3 IS BASED ON IMPACTION+MOBILITY +BUSING/2
RANGE NUMBER 3 MUST BE USED FOR THIS PROGRAM

 TYPE IN THE NUMBER OF THE RANGE (1,2,3,4) YOU DESIRE TO USE
? >3
 TYPE IN THE NUMBER OF SCHOOLS INCLUDED IN THIS RUN
? >24
```

SCHOOL	PRESENT P/T RATIO	NEW P/T RATIO	MANAGEMENT INDEX	PRES NO. TCHR. POS.	NEW NO. TCHR POS.
ALCOTT	29.076923	26.385	204	13	13.141937
AMEDEE	28.38	26.385	167	25	25.995331
ASBURY	29.6	26.385	117.5	10	9.4972521
ASH GROVE	19.75	26.385	145	12	8.5332575
ASHLEY	27.382353	26.385	212	17	17.066515
BARNUM	27.727273	26.385	133	11	10.931618
BARRETT	26.173913	26.385	221	11.5	10.807597
BEACH CT.	27.0	26.385	76.5	10	10.039475
BELMONT	27.166666	26.385	59	6	5.8688649
BERKELEY	26.3	26.385	195.5	10	9.643422
BOULEVARD	22	26.385	140	9.5	7.525109
BRADLEY	29.037037	25.451216	421.5	27	28.256017
BRONWELL	26.181818	26.385	101.5	11	10.369528
BROWN	27.733333	26.385	210	15	14.978207
BRYANT WEB.	27.8	25.534451	279	15	15.514212
CAPROCN	21.300226	26.385	136	15.5	11.66572
CHELTENHAM	27.343478	25.39079	357	23	22.3953
COLFAX	27.142857	26.385	122	10.5	10.261512
COL. VIEW	27.181818	26.385	99	11	10.765506
COLUMBIAN	26.347826	26.385	133	11.5	10.909608
COLUMBINE	23.326087	26.385	211.5	11.5	9.8654537
CORY	22.166666	26.385	106.5	6	4.7887057
COWELL	24	26.385	115	13	11.230655
CROFTON	24.533333	26.385	232	7.5	6.6243763

```
 THE NUMBER OF NEEDED TEACHERS IS  296.23504
 THE DISTRICT AVERAGE MANAGEMENT INDEX NUMBER IS  259
 THE DISTRICT PUPIL TEACHER AVERAGE IS 26.210497

TIME :    .667
```

```
OLD:ELSTAFF4T2
>>RUN
ELSTAFF4T2   13:26:23   22 OCT 79

 THIS PROGRAM CALCULATES A MANAGEMENT INDEX NUMBER FOR EACH SCHOOL
 AND INDICATES THE NUMBER OF TEACHERS REQUIRED FOR STAFFING PURPOSES

 TYPE THE TOTAL NUMBER OF PUPILS IN GRADES 1-6 FOR THE DISTRICT
? >33311
TYPE IN THE AVGE CLASS SIZE FOR GRADES 1-6
? >26.385
 TYPE IN THE TOTAL NUMBER OF TEACHING POSITIONS IN THE DISTRICT
 FOR GRADES 1-6
? >1271
INDEX 3 IS BASED ON IMPACTION+MOBILITY +BUSING/2
RANGE NUMBER 3 MUST BE USED FOR THIS PROGRAM

 TYPE IN THE NUMBER OF THE RANGE (1,2,3,4) YOU DESIRE TO USE
? >3
 TYPE IN THE NUMBER OF SCHOOLS INCLUDED IN THIS RUN
? >24
```

SCHOOL	PRESENT P/T RATIO	NEW P/T RATIO	MANAGEMENT INDEX	PRES NO. TCHR. POS.	NEW NO. TCHR POS.
DEL PUEBLO	30.99091	25.32261	275	11	12.417756
DENISON	24.666666	26.385	139	9	7.9931779
DOULL	24.133333	26.385	114.5	15	13.033921
EAGLETON	27.214286	26.385	198	14	13.718022
EBERT	27.909091	25.243151	305.5	11	11.553629
EDISON	25.142857	25.708036	337.5	21	19.513801
ELLIS	22.59091	26.385	250	22	17.394637
ELLSWORTH	24.666666	26.385	87	6	5.3287953
ELYRIA	22.285714	26.385	46	3.5	2.8084138
EMERSON	26.222222	26.385	214	9	8.4972521
FAIRMONT	25.5	25.51651	358	16	15.190165
FAIRVIEW	25.931034	24.5701	436	14.5	14.537995
FALLIS	25.111111	26.385	132.5	9	8.137199
FORCE	24.222222	26.385	230	18	15.698313
FORD	27	26.385	165.5	26	25.275725
GARDEN PL.	26.125	26.385	244.5	8	7.525109
GILPIN	26.916666	25.297381	271	12	12.129714
GODSMAN	29.67742	26.385	154	15.5	16.562441
GOLDRICK	27.948718	25.729403	344.5	19.5	20.122992
GREENLEE	24.6	24.97514	289.5	10	9.3573052
GUST	24.125	25.46873	274	16	14.398048
HALLETT	24	26.385	203.5	17	14.693165
HARRINGTON	25.117647	25.553938	253	17	15.874266
HOLM	26.125	25.813285	268.5	24	23.375327

```
THE NUMBER OF NEEDED TEACHERS IS  325.33104
THE DISTRICT AVERAGE MANAGEMENT INDEX NUMBER IS  250
THE DISTRICT PUPIL TEACHER AVERAGE IS 26.208497

TIME :    .682
>>
```

```
OLD:ELSTAFF4T3
>RUN
ELSTAFF4T3   13:32:28   22 OCT 75

 THIS PROGRAM CALCULATES A MANAGEMENT INDEX NUMBER FOR EACH SCHOOL

 AND INDICATES THE NUMBER OF TEACHERS REQUIRED FOR STAFFING PURPOSES


 TYPE THE TOTAL NUMBER OF PUPILS IN GRADES 1-6 FOR THE DISTRICT
? >33311
TYPE IN THE BASE CLASS SIZE FOR GRADES 1-6
? >26.385
 TYPE IN THE TOTAL NUMBER OF TEACHING POSITIONS IN THE DISTRICT
 FOR GRADES 1-6
? >1271
INDEX D IS BASED ON IMPACTION+MOBILITY+BUSING/2
RANGE NUMBER 3 MUST BE USED FOR THIS PROGRAM


 TYPE IN THE NUMBER OF THE RANGE (1,2,3,4) YOU DESIRE TO USE
? >3
 TYPE IN THE NUMBER OF SCHOOLS INCLUDED IN THIS RUN
? >24
```

SCHOOL	PRESENT P/T RATIO	NEW P/T RATIO	MANAGEMENT INDEX	PRES NO. TCHR. POS.	NEW NO. TCHR POS.
JOHNSON	26.076923	26.385	129	13	12.205799
KAISER	26.607143	25.436716	420	28	27.823953
KNAPP	28.166666	26.385	201	18	18.25469
KNIGHT	16.25	26.385	152.5	8	4.6806898
LINCOLN	27.12	26.385	226	12.5	12.205799
MCKINLEY	23.833333	26.385	25	6	5.1487588
MCMEEN	26.578947	26.385	167	19	18.18268
MITCHELL	25.8	24.413885	522.5	20	20.078738
MONTELLO	28.714286	26.385	122.5	7	7.2370664
MONTOAK)	27.9	26.385	183.5	10	10.04548
MONTCLAIR	27.111111	25.654946	301	18	18.07059
MOORE	29.933333	25.593436	297.5	15	16.666382
MUNROE	27.071428	26.385	175	14	13.646011
NEWLON	25.947368	26.385	109	19	17.750616
PALMER	26.608695	26.385	174	11.5	11.017624
PARK HILL	29.035714	26.385	186.5	28	29.272314
PHILIPS	28.769231	26.385	72	13	13.465984
PITTS	25.307692	26.385	121.5	13	11.845746
REMINGTON	25	26.385	239	13	11.701724
ROSEDALE	27	26.385	216	11	10.693576
SABIN	25.346154	25.840474	313.5	26	24.227496
SAMUELS	29.857143	26.385	194	28	30.100436
SCHENCK	28.962963	26.385	187.5	13.5	14.078075
SCHMITT	23.882353	26.385	113	17	14.618154

```
THE NUMBER OF NEEDED TEACHERS IS  373.01835
THE DISTRICT AVERAGE MANAGEMENT INDEX NUMBER IS  250
THE DISTRICT PUPIL TEACHER AVERAGE IS 26.208497


TIME :    .659

>>
```

```
OLD:ELSTAFF4T4
>>RUN
ELSTAFF4T4   13:38:18   22 OCT 75

 THIS PROGRAM CALCULATES A MANAGEMENT INDEX NUMBER FOR EACH SCHOOL

 AND INDICATES THE NUMBER OF TEACHERS REQUIRED FOR STAFFING PURPOSES


 TYPE THE TOTAL NUMBER OF PUPILS IN GRADES 1-6 FOR THE DISTRICT
? >33311
TYPE IN THE BASE CLASS SIZE FOR GRADES 1-6
? >26.385
 TYPE IN THE TOTAL NUMBER OF TEACHING POSITIONS IN THE DISTRICT
 FOR GRADES 1-6
? >1271
INDEX D IS BASED ON IMPACTION+MOBILITY+BUSING/2
RANGE NUMBER 3 MUST BE USED FOR THIS PROGRAM


 TYPE IN THE NUMBER OF THE RANGE (1,2,3,4) YOU DESIRE TO USE
? >3
 TYPE IN THE NUMBER OF SCHOOLS INCLUDED IN THIS RUN
? >21
```

SCHOOL	PRESENT P/T RATIO	NEW P/T RATIO	MANAGEMENT INDEX	PRES NO. TCHR. POS.	NEW NO. TCHR POS.
SHERMAN	25.333333	26.385	72	6	5.4728065
SLAVENS	28.111111	26.385	223.5	18	18.218685
SMEDLEY	29.666666	25.586537	282	15	16.522361
SMITH	25.083333	25.221393	432.5	24	22.675194
STECK	27.181818	26.385	108	11	10.765586
STEDMAN	26.4	26.385	180.5	10	9.5054007
STEELE	24.285714	26.385	93	7	6.120902
STEVENS	22.4	26.385	122.5	7.5	6.0488914
SWANSEA	26.102564	26.385	240	19.5	18.326701
TELLER	24.75	26.385	144	12	10.693576
THATCHER	28.5	26.385	88.5	4	4.1046048
TRAYLOR	25.227273	26.385	209.5	22	19.982945
UNIV. PARK	23.3125	26.385	160	16	13.42998
VALDEZ	27.052631	25.690904	287.5	19	19.006727
VALVERDE	30.413793	26.385	183	14.5	15.87834
WASH. PARK	23.833333	26.385	83	12	10.297517
WESTWOOD	25.4	26.385	162.5	15	13.718022
WHITEMAN	26.5625	26.385	238	16	15.302255
WHITTIER	30.111111	26.385	216	9	9.757438
WYATT	25.73913	25.202619	272	11.5	11.157571
WYMAN	30.086957	25.044759	390.5	17.25	19.686754

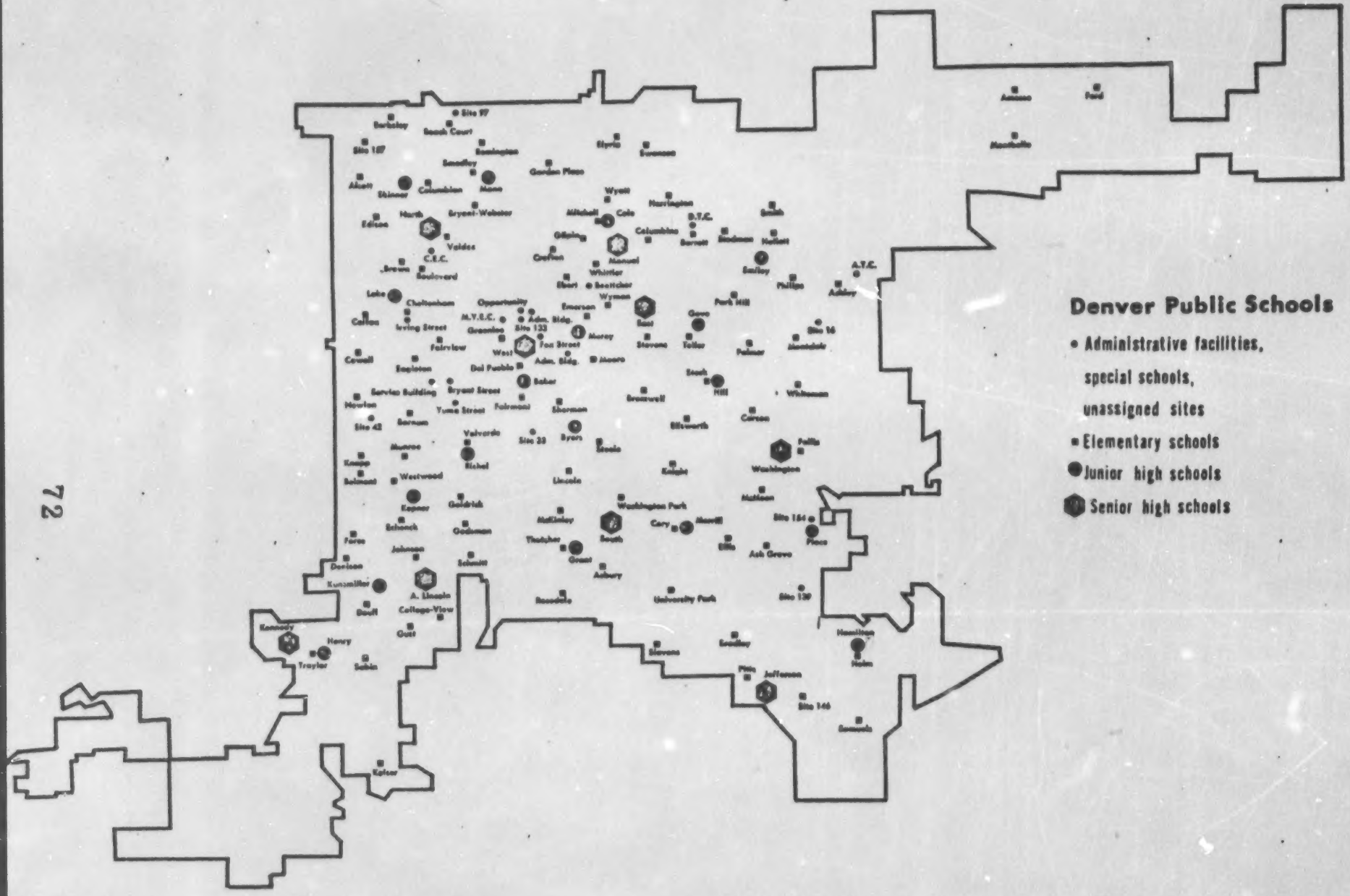
```
 THE NUMBER OF NEEDED TEACHERS IS  276.67224
 THE DISTRICT AVERAGE MANAGEMENT INDEX NUMBER IS  250
 THE DISTRICT PUPIL TEACHER AVERAGE IS 26.208497

 TIME :    .607

>>
```

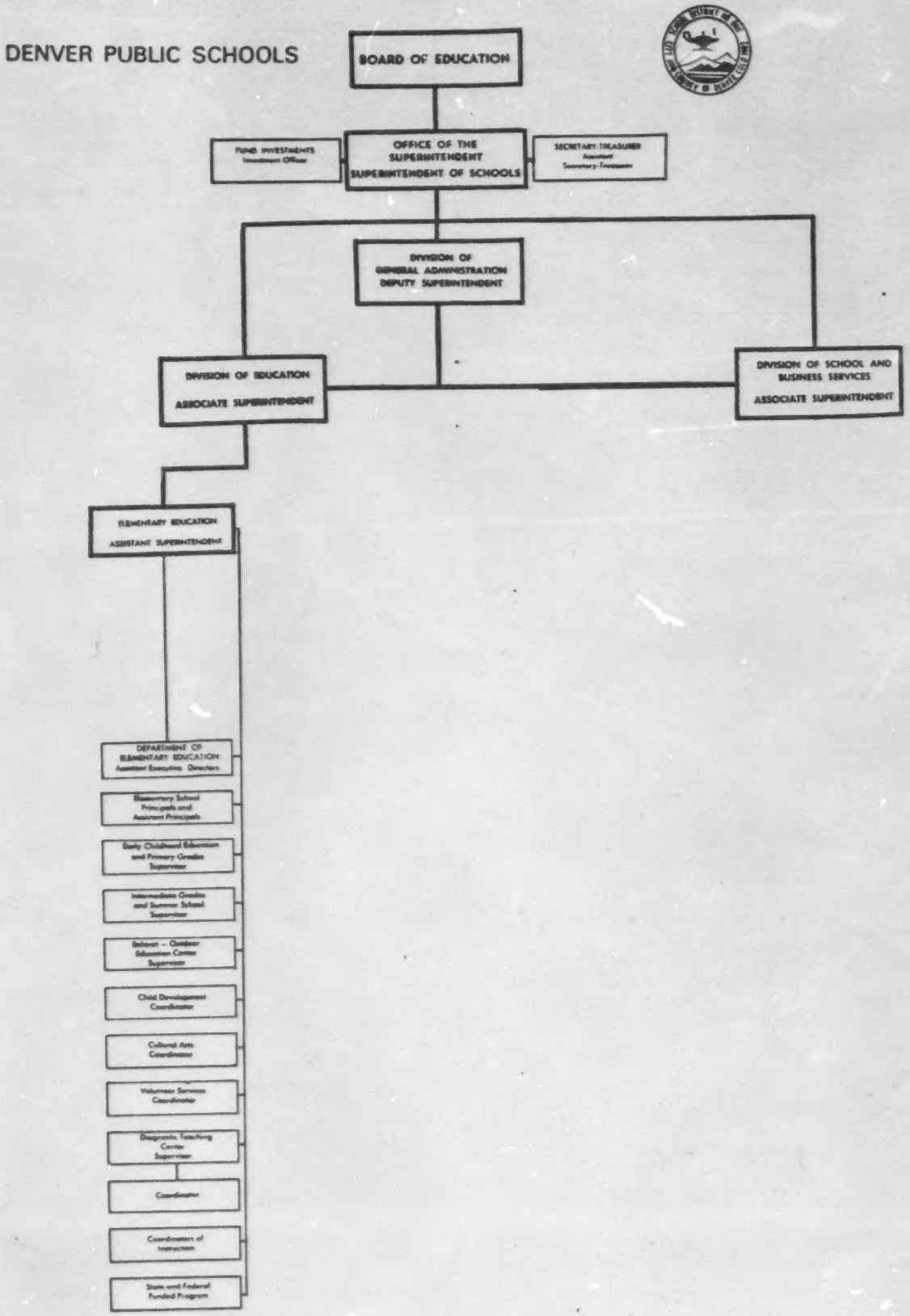
Total 1271.25697

APPENDIX B


Denver Public Schools
• Administrative facilities, special schools, unassigned sites
▪ Elementary schools
● Junior high schools
Senior high schools

APPENDIX C

ADMINISTRATION AND SUPERVISION ORGANIZATION CHART



DENVER PUBLIC SCHOOLS
Division of Education
Department of Elementary Education

SCHOOL GROUPINGS BY SECTION

SECTION I
Frank Roberts

Alcott
Amesse
Beach Court
Berkeley
Colfax
Columbian
Cowell
Denison
Doull
Eagleton
Force
Ford
Gilpin
Godsman
Goldrick
Johnson
Mitchell
Montbello
Oakland
Palmer
Remington
Rosedale
Smedley
Steck
Teller
Whiteman

SECTION II
Manuel Andrade

Ashley
Barnum
Boulevard
College View
Columbine
Crofton
Del Pueblo
Fairmont
Fairview
Fallis
Greenlee
Kaiser
Lincoln
McKinley
McMeen
Montclair
Newlon
Park Hill
Philips
Schmitt
Sherman
Smith
Steele
Traylor
Thatcher
University Park

SECTION III
Orville Turner

Asbury
Barrett
Belmont
Bromwell
Brown
Bryant-Webster
Cheltenham
Ebert
Ellsworth
Emerson
Garden Place
Gust
Holm
Knapp
Knight
Moore
Munroe
Pitts
Samuels
Schenck
Slavens
Stevens
Swansea
Valdez
Westwood
Whittier
Wyman

SECTION IV
Walter Oliver

Ash Grove
Boettcher
Bradley
Carson
Cory
Edison
Ellis
Hallett
Harrington
Sabin
Stedman
Valverde
Washington Park
Wyatt

APPENDIX D

DENVER PUBLIC SCHOOLS
Division of Education
Department of Elementary Education

EQUITABLE AND EFFICIENT STAFFING OF ELEMENTARY SCHOOLS

Suggested Time Line

1975
March 6 — Introduction of project to Advisory Committee

Distribution of -
1) Statement of the problem
2) Memo to all principals describing some possible variables which may affect the staffing of an elementary school.

March 21
A. Principals who are interested in participating in the project will return completed forms to the Department of Elementary Education

B. All principals are urged to react to the listed variables - make suggestions and return forms to the Department of Elementary Education

April 3 — Report of progress - Elementary Principals Advisory Meeting

April 4 — Discussion meeting with principals participating in trial project - reviewing trial assignments of teacher allocations:

Department of Elementary Education
EMIS

May 1 — Report of progress - Elementary Principals Advisory Meeting

May 15 — Report of progress - Elementary Principals General Meeting

1975

May 22 — Discussion meeting with principals participating in trial project -

- review of all school need variables
- additional trial runs with variables
- discussion of staff process and procedure

October 10 — Discussion meeting with principals participating in trial project -

- review pupil membership and evaluate appropriateness of staff allocations
- consider methods of making needed adjustments in staffing
- evaluate process and procedure (equitableness and efficiency)

Nov. 20 — Report of progress (conclusions) - Elementary Principals General Meeting

Dec. 18 — Discussion with total principal group - Final determinations and procedures for February staffing.

1976

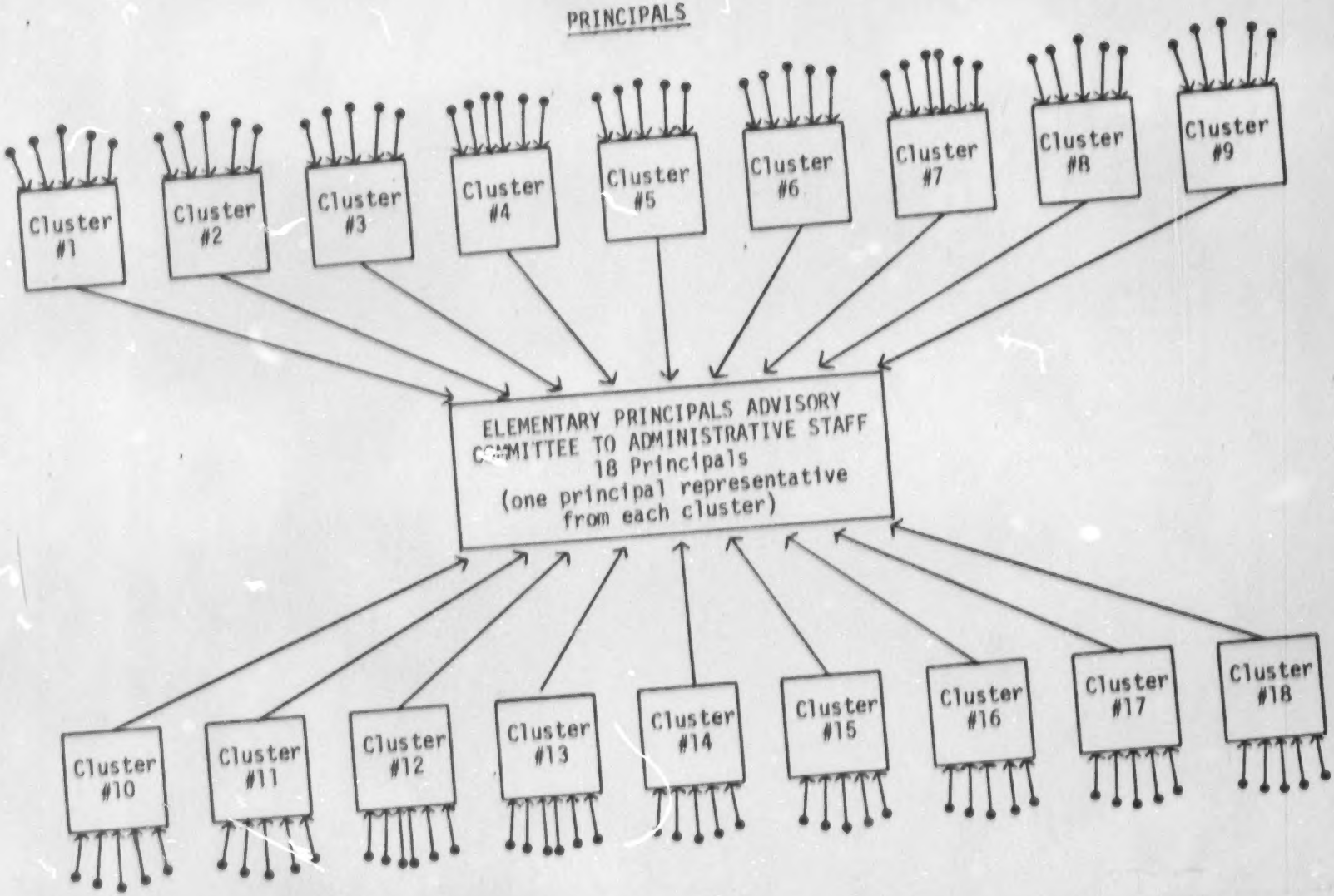
January — Notification to all principals numbers of certificated staff to be allocated to individual buildings utilizing computerized procedure.

February — Request for staffing allocations submitted by principals to Elementary Education Directors for preliminary staffing.

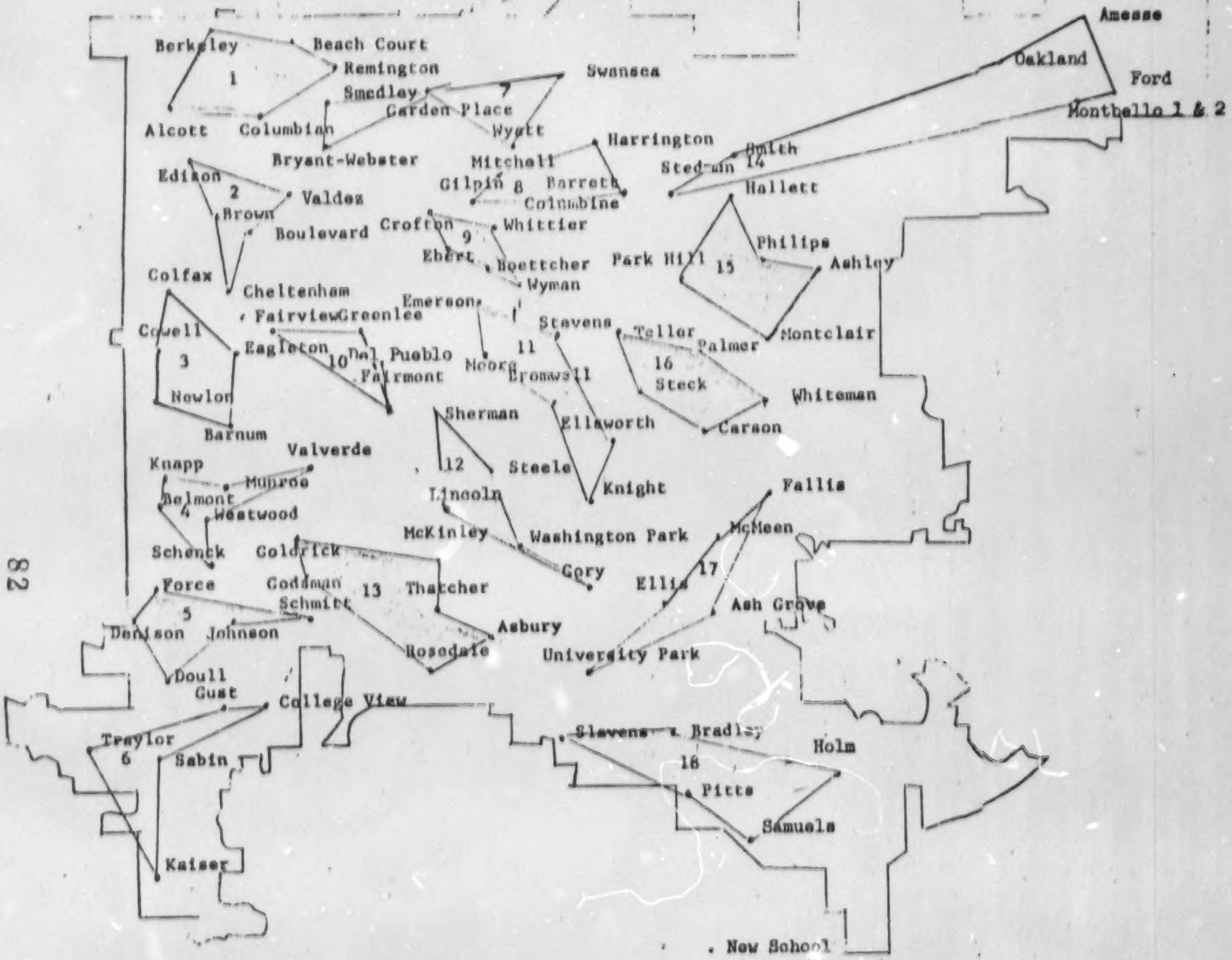
September — Final staffing utilizing computerized staffing procedure.

Approved:
Mr. Walter B. Oliver
3/5/75

APPENDIX E


PRINCIPALS
Cluster #1
Cluster #2
Cluster #3
Cluster #4
Cluster #5
Cluster #6
Cluster #7
Cluster #8
Cluster #9
ELEMENTARY PRINCIPALS ADVISORY COMMITTEE TO ADMINISTRATIVE STAFF
18 Principals
(one principal representative from each cluster)
Cluster #10
Cluster #11
Cluster #12
Cluster #13
Cluster #14
Cluster #15
Cluster #16
Cluster #17
Cluster #18

APPENDIX F


Berkeley
Beach Court
1
Remington
Swansea
Smedley
Garden Place
Alcott
Columbian
Wyatt
Bryant-Webster
Harrington
Mitchell
Edison
2
Valdez
Gilpin
Barrett
Columbine
Brown
Boulevard
Crofton
Whittier
9
Ebert
Boettcher
Wyman
Colfax
Cheltenham
Fairview
Greenlee
Emerson
Stevens
Teller
Palmer
Montclair
Cowell
Eagleton
10
Del Pueblo
11
Moore
Fairmont
Cromwell
16
Steck
Whiteman
3
Newlon
Barnum
Sherman
Ellsworth
Carson
Valverde
Knapp
12
Steele
Munroe
Belmont
Lincoln
Knight
Fallis
4
Westwood
McKinley
Washington Park
McMeen
Schenck
Colorick
Gary
Force
Goodman
13
Thatcher
Ellis
17
Schmitt
Ash Grove
5
Denison
Johnson
Asbury
Rosedale
University Park
Doull
Gust
College View
Traylor
6
Sabin
Stevens
Bradley
Holm
16
Pitts
Samuels
Kaiser
New School
Amesse
Oakland
Ford
Monticello 1 & 2
Smith
Stedman
14
Hallett
Philips
Park Hill
15
Ashley

APPENDIX G

DENVER PUBLIC SCHOOLS
INTERDEPARTMENTAL COMMUNICATION

To ALL PRINCIPALS

From Department of Elementary Education

Date March 6, 1975

Subject Possible Variables for Consideration in the Calculation of Elementary Staffing Needs

Following are some variables developed in cooperation with Mr. John Temple that may be considered in our first steps to develop a procedure for equitable staffing. Will you consider these possibilities and in the area provided list any additional factors that you feel should be considered as the entire process is examined.

1. Mobility (First semester 1974-75)

   Entire plus withdrawals for the month of October, November, December and January divided by the official September 1974 membership. This factor could be entered in the formula either in the form of a number (ins and outs) or as a mobility percentage.

   Comments:

2. Enrollment

   The number to be used should probably be the membership of each school unit on approximately November 1, 1974. This membership, it appears, will probably represent the most stable membership for the first semester.

   Comments:

Use this sheet to discuss one subject only.

DENVER SCHOOL PRESS
STOCK NO. 01-022908

3. Impaction (Pupils whose families are on A.F.D.C.)

The only recent data available are numbers and percents of children from families receiving Aid for Dependent Children based on projected September 1974 membership. These projected numbers and percents of A.F.D.C. pupils were calculated in July 1974.

Comments:

4. Achievement in Math and Reading

The number or percent of fourth grade pupils one or more stanines below the national fifth stanine level of achievement for fourth grade pupils could be entered as a factor in the formula.

Comments:

5. Adequacy of School Plant

It is suggested that administrative personnel from Facility Planning or Elementary Education or both, rate each elementary school on plant adequacy relative to staff (teacher) needs. A scale of 0 to 99 might be used with 0 indicating that plant adequacy should not be considered a factor in determining staff needs for specific schools whereas a rating of 1 or more would indicate that plant adequacy should at least be considered in the determination of staff needs.

Comments:

6. Pairing of Schools for Integration

It is suggested that schools involved in pairing for purposes of integration might be given bonue points in calculating a number. The size of the bonus is open for discussion.

Comments:

7. Transportation of Pupils

The number of pupils or percent of pupils transported to a school for any reason on a regular basis could be a factor included in the calculating.

Comments:

Other variables I wish you to consider:

Additional Comments or Suggestions:

I would like my building to be included as a trial school and am willing to meet periodically with the department to give input and other suggestions.

Name _____

School _____

Type of School (Please circle):

Paired
Long Bus
Short Bus
Rezoned
Bilingual

Please return this sheet to Orville D. Turner, Department of Elementary Education no later than March 21, 1975.

/cbr

DENVER PUBLIC SCHOOLS
Division of Education
Department of Elementary Education

MARCH 1975

VARIABLES FOR CONSIDERATION IN THE CALCULATION OF ELEMENTARY SCHOOL STAFFING NEEDS

A survey was sent to all eighty-four (84) elementary school principals. Completed surveys were received from thirty-six (36) principals, a 42.9 percent return. Principals were given a list of several possible variables to be considered in developing a procedure for equitable staffing; they were asked to comment on each variable, and to list any additional variables that they wished to be considered. An analysis of the responses is presented below. Where appropriate, comments have been grouped between those that were supportive, and those that were suggestive of other alternatives or critical in some aspects. Multiple responses are indicated in parentheses.

Mobility

Supportive

- This is an important factor (28)
- This variable is objective and can be measured (2)

Suggestive/Critical

- This has little to do with staffing except for clerical help.

Enrollment

Supportive

- This is an important factor (19)
- This variable is the most important (13)

Supportive/Critical

- This should not receive more weight than other factors.

Impaction

Supportive

- This is an important factor (24)
- Second most important factor (3)

Suggestive/Critical

- Numbers of pupils receiving free lunches and breakfast are important; extra supervision is required.

Achievement

Supportive

- This variable should be included (5)

Suggestive/Critical

- This should not be included at this time (9)
- It may encourage a school to do poorly (4)
- It is not directly related to size of staff as much as to teacher competency and accountability.

Adequacy of School Plant

Supportive

- This variable should be included (8)

Suggestive/Critical

- This variable should not be included (12)
- This is not related directly to class size (3)

Pairing

Supportive

- This variable should be included (7)

Pairing (continued)

Suggestive/Critical

- Schools with satellite areas also must be included (7)
- Add the students received from the paired school to the total enrollment (3)
- Pairing does not affect class size; it does affect the clerical load (2)

Transportation

Supportive

- This is an important factor (23)

Suggestive/Critical

- This has some importance, but should receive less weight than enrollment (4)

Other Variables to Consider

Suggestive/Critical

- Total original registrations (3)
- Competencies of staff members (3)
- Schools operating at or near capacity (2)
- Degree of cultural deprivation
- Number of probationary teachers
- Teacher turnover rate
- Militancy of teachers

FER:ODT/cbr

APPENDIX H

DENVER PUBLIC SCHOOLS
414 FOURTEENTH STREET / DENVER, CO 80202
LOUIS J. KISHKUNAS, *Superintendent*

DIVISION OF EDUCATION
ROSCOE L. DAVIDSON, *Assistant Superintendent*

DEPARTMENT OF ELEMENTARY EDUCATION
WALTER B. OLIVER, *Executive Director*

April 17, 1975

Dear

We are in the initial phases of attempting to develop a procedure to more efficiently staff our elementary schools in Denver through a computer assisted model. To do this we know that we will need to develop "need" variables that will guide us as we look at individual schools in our district.

We do not know if any large districts such as yours have already developed procedures that might assist us in our development plans. If you have, your advice will certainly aid us at this time. We are enclosing a questionnaire that we would appreciate your responding to should you feel steps you have already taken can assist us.

If your district has not moved in this direction we would appreciate your reaction none the less. We are presently working with our elementary principals to develop variables to be considered in staffing needs and any input from you will help us avoid inventing the total wheel over again.

We thank you for your time and kind assistance. We would appreciate your returning the questionnaire at your earliest convenience.

Sincerely,

Walter B. Oliver

Walter B. Oliver
Executive Director
Elementary Education

Frank E. Roberts
Assistant Executive Director
Elementary Education

Orville D. Turner
Assistant Executive Director
Elementary Education

WBO/cbr
Enclosure (1)

LARGE CITY SCHOOLS SURVEYED ON PROCEDURES

FOR THE ALLOCATION OF ELEMENTARY SCHOOL TEACHERS

Atlanta Public Schools
Atlanta, Georgia

Birmingham Public Schools
Birmingham, Alabama

Boston Public Schools
Boston, Massachusetts

Cincinnati Public Schools
Cincinnati, Ohio

Columbus Public Schools
Columbus, Ohio

Dallas Independent School District
Dallas, Texas

Detroit Public Schools
Detroit, Michigan

Ft. Worth Independent School District
Ft. Worth, Texas

Houston Independent School District
Houston, Texas

Indianapolis Public Schools
Indianapolis, Indiana

Duvall County Public Schools
Jacksonville, Florida

School District of Kansas City, Mo.
Kansas City, Missouri

Long Beach Unified School District
Long Beach, California

Los Angeles Unified School District
Gardena, California

Louisville Public Schools
Louisville, Kentucky

Memphis City Schools
Memphis, Tennessee

Dade County Public Schools
Miami, Florida

Minneapolis Public Schools
Minneapolis, Minnesota

Metropolitan Public Schools
Nashville, Tennessee

Newark Public Schools
Newark, New Jersey

New Orleans Public Schools
New Orleans, Louisiana

Oakland Unified School District
Oakland, California

Oklahoma City Public Schools
Oklahoma City, Oklahoma

School District of Philadelphia
Philadelphia, Pennsylvania

Pittsburgh Public Schools
Pittsburgh Pennsylvania

Portland Public Schools
Portland, Oregon

Saint Paul Public Schools
Saint Paul, Minnesota

San Diego City Schools
San Diego, California

Hillsborough County Public Schools
Tampa, Florida

Toledo Public Schools
Toledo, Ohio

Tulsa Public Schools
Tulsa, Oklahoma

School District No. 39
Vancouver, B. C.

Wichita Public Schools
Wichita, Kansas

DENVER PUBLIC SCHOOLS
Division of Education
Department of Elementary Schools
April 17, 1975

Personnel in the Denver Public Schools' Department of Elementary Education are investigating the possibility of implementing a more objective, computer-assisted procedure for the allocation of teachers at the elementary school level, specifically grades one through six, including physical education and IMC teachers. This procedure would consider the staffing needs of individual schools in relation to a number of factors, such as enrollment, mobility, and achievement levels in reading. Each of the factors will be represented as a number and used in the computer program.

The purpose of the following questionnaire is to determine whether other school districts have implemented a similar procedure to assist in allocating teachers, as well as those factors that, in your opinion, whould be considered in staffing procedures.

Thank you for your assistance.

* * * * * * * * *

Directions: *Please fill in the requested information or encircle the numeral that represents the appropriate response.*

1. Have you implemented a computer-assisted procedure for the assignment of classroom teachers to your elementary schools?

   Yes 1
   No 2

2. Please rate the importance of each of the following factors. Also, please indicate whether you use the factor as a determinant of teacher staffing needs for your elementary schools.

	Very important	Somewhat important	Somewhat unimportant	Very unimportant	No opinion	Determinant of staffing needs in your district? Yes	No
a. Student enrollment	1	2	3	4	5	1	2
b. Mobility	1	2	3	4	5	1	2
c. Poverty impaction	1	2	3	4	5	1	2
d. Number of students significantly below grade level in							
1) reading	1	2	3	4	5	1	2
2) mathematics	1	2	3	4	5	1	2
e. Adequacy of the school building (size, age, number of floors, etc.)	1	2	3	4	5	1	2

OVER

3. Please list below any additional factors that you feel should be considered in an objective staffing procedure.

_____

_____

_____

_____

_____

_____

4. Additional comments regarding staffing procedures:

Thank you for your assistance. We will be happy to share the results of our procedure, once it has been developed. If you wish to have a copy, please provide your name and address below. Thank you.

_____

_____

_____

Zip code

DENVER PUBLIC SCHOOLS
Division of Education
Department of Elementary Education

June 1975

SURVEY ON PROCEDURES FOR THE ALLOCATION OF ELEMENTARY SCHOOL TEACHERS

A survey was mde of 33 large city school systems to explore ways that they allocated teachers to their elementary schools. Completed survey forms were received from 22 school districts, a 66.0 percent return. An analysis of the responses is presented below.

Please rate the important of each of the following factors. Also, please indicate whether or not you use the factor as a determinant of teacher staffing needs for your elementary schools.

	Very important	Somewhat important	Somewhat unimportant	Very unimportant	No opinion	TOTAL N	TOTAL %	Determinant of staffing needs in your district? Yes	No	TOTAL N	TOTAL %
a. Student enrollment	90.9%	9.1%	0.0%	0.0%	0.0%	22	100.0%	100.0%	0.0%	18	100.0%
b. Mobility	13.6	59.1	13.6	4.6	9.1	22	100.0%	36.8	63.2	19	100.0%
c. Poverty impaction	40.9	45.5	0.0	13.6	0.0	22	100.0%	64.7	35.3	17	100.0%
d. Number of students significantly below grade level in (1) reading	54.6	22.7	13.6	0.0	9.1	22	100.0%	50.0	50.0	18	100.0%
(2) mathematics	45.5	31.8	13.6	0.0	9.1	22	100.0%	33.3	66.7	18	100.0%
e. Adequacy of the school building (size, age, number of floors, etc.)	22.7	22.7	31.8	9.1	13.7	22	100.0%	52.9	47.1	17	100.0%

Have you implemented a computer-assisted procedure for the assignment of classroom teachers to your elementary schools?	yes	0.0 %
	no	100.0
	total	100.0 %

(N = 22)

Two open-ended items were included in the questionnaire. The responses are summarized below. Multiple responses are indicated in parentheses.

Please list below any additional factors that you feel should be considered in an objective staffing procedure:

- Special programs, such as special reading, selective reading and mathematics, mastery learning, continuous progress, etc. (3)
- Race: minority and non-minority (2)
- Federal- and state-funded programs (2)
- Numbers and types of special education programs (2)
- Organizational patterns, such as K-6, K-8, 5-8, etc. (2)
- Formula for allocating special resource personnel, such as art, music, and physical education teachers; librarians, guidance counselors, etc. (2)
- Sex of the teacher (2)
- Age of the teacher (2)
- Teacher preparation
- Length of service in the school district
- State accreditation standards
- Types of teaching procedures (teaming, alternative, open classrooms, learning center approach, contract, self-contained, etc.)
- Amount of assistance from specialists and support personnel
- Number of teacher aide hours
- All schools share equally on basic allotment of classroom teachers, administrators, and support personnel of 1 FTE per 20.00 pupils; additional county, state, and federal monies make up for factors other than enrollment
- Special needs of the school (special problems that require extra staff allocations, as determined by committees of central office personnel, principals, and teachers)

- Management index determined on enrollment and percent of AFDC pupils
- A composite of enrollment, achievement in reading and mathematics, transciency, and bilingualism
- Bilingualism
- Enrollment projections
- Number of students with learning disabilities
- Information about parent income and educational level; also, numbers of single-parent families.

Additional comments regarding staffing procedures.

- Staffing is based on pupil enrollment (6)
  - formula is 1 teacher per 28 pupils (grades 1 to 3 are given 20% extra funding for teachers, aides, or a combination of both)
  - $\frac{\text{K-3 enrollment}}{29.7} + \frac{\text{4-6 enrollment}}{32.0}$ = no. of teachers needed, plus a pool of teachers (approximately 0.5% of the total) allocated to schools with special needs, as determined by a reviewing committee.
- Federal funds to Title I schools provide for extra staff needs (2)
- Title IX and Title IV of the U.S. Civil Rights Act will have to be considered in the staffing process.
- Rotation of teachers
- Rotation of principals
- We must recognize the need to provide for children with special learning problems.
- Staffing procedures should allow for unusual situations.

APPENDIX I

RANDOM SELECTED SCHOOLS

RUN RESULTS OF ELEMENTARY STAFFING COMPUTER PROGRAM FOR FIFTEEN SCHOOLS

School	El. Educ. Tent. Staff - April 1975	1975 Projected School Membership Based On 95% Of November 1, 1974 Membership										Actual September 10, 1975 Membership	
		D=I+M+P+B C.S.=26.3 Alloc.=1292	D=I+M+B/2+P C.S.=26.3 Alloc.=1292	D=2I+M+P+B C.S.=26.3 Alloc.=1292	D=I+M+B/2 C.S.=26.3 Alloc.=1292	D=I+M+P+B C.S.=26.7 Alloc.=1271	D=I+M+B/2+P C.S.=26.7 Alloc.=1271	D=2I+M+P+B C.S.=26.7 Alloc.=1271	D=I+M+B C.S.=26.7 Alloc.=1271	D=2I+M+B C.S.=26.7 Alloc.=1271	D=2I+B C.S.=26.77 Alloc.=1271	D=I+M+B/2 C.S.=26.68 Alloc.=1249	D-I+M+B C.S.=27.068 Alloc.=1249
A	13.5	13.5	13.5	13.5	13.0	13.5	13.5	13.5	13.5	13.5	13.5	13.0	13.5
B	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	7.0	7.0
C	15.5	17.5	17.5	17.0	17.0	17.5	17.5	17.5	17.5	17.5	17.0	16.0	16.0
D	11.5	11.5	11.5	11.5	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0
E	28.0	29.0	28.5	28.0	28.5	28.5	28.0	28.5	28.5	28.0	28.5	27.0	27.0
F	11.0	10.5	10.5	10.5	10.0	10.0	10.0	10.0	10.0	10.0	10.0	12.0	12.5
G	8.0	8.0	8.0	8.0	7.5	8.5	8.0	8.0	8.0	8.0	8.0	9.0	9.0
H	16.0	16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.0	15.5
I	10.0	9.5	10.0	9.5	9.5	9.5	10.0	9.5	9.5	9.5	9.5	9.0	8.5
J	14.5	14.5	14.5	14.5	14.5	14.0	14.0	14.0	14.0	14.0	14.0	13.0	13.0
K	19.0	18.5	18.5	18.5	18.5	18.0	18.0	18.0	18.0	18.5	18.0	19.0	18.5
L	10.0	11.0	11.0	11.0	10.5	11.0	11.0	11.0	11.0	11.0	11.0	9.0	9.5
M	17.0	16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.0
N	14.0	14.0	14.0	14.0	14.0	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5
O	19.0	19.5	19.5	19.5	19.5	19.5	19.0	19.5	19.5	19.5	19.5	20.5	20.5

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OLD:ELOTAFF501
>RUN
ELOTAFF501    08:11:51    30 OCT 75
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ALPHABETIZED SCHOOL RUNS

```
 THIS PROGRAM CALCULATES A MANAGEMENT INDEX NUMBER FOR EACH SCHOOL

 AND INDICATES THE NUMBER OF TEACHERS REQUIRED FOR STAFFING PURPOSES


 TYPE THE TOTAL NUMBER OF PUPILS IN GRADES 1-6 FOR THE DISTRICT
? >32917
TYPE IN THE BASE CLASS SIZE FOR GRADES 1-6
? >27.0677
 TYPE IN THE TOTAL NUMBER OF TEACHING POSITIONS IN THE DISTRICT
 FOR GRADES 1-6
? >1249
 INDEX IS BASED ON IMPACTION + MOBILITY +BUSING
 RANGE NUMBER 1 MUST BE USED FOR THIS PROGRAM


 TYPE IN THE NUMBER OF THE RANGE (1,2,3,4) YOU DESIRE TO USE
? >1
 TYPE IN THE NUMBER OF SCHOOLS INCLUDED IN THIS RUN
? >24
```

SCHOOL	PRESENT P/T RATIO	NEW P/T RATIO	MANAGEMENT INDEX	PRES NO. TCHR. POS.	NEW NO. TCHR POS.
ALCOTT	27	26.062772	296	13	13.467485
AMESSE	28.2	27.0677	184	25	26.045803
ASBURY	19.2	27.0677	177	10	7.0933253
ASH GROVE	20.166666	25.634112	260	12	9.4405453
ASHLEY	24.941176	26.230438	279	17	16.164426
BARNUM	26.454545	27.0677	141	11	10.750821
BARRETT	25.043478	25.052811	336	11.5	11.139988
BEACH CT	24.9	27.0677	97	10	9.1991562
BELMONT	25.166666	27.0677	59	6	5.5786048
BERKELEY	23.6	25.599642	316	10	9.218879
BOULEVARD	20.736842	27.0677	140	9.5	7.2780473
BRADLEY	25.666666	25.569624	704	27	27.102471
BRONWELL	24.363636	27.0677	159	11	9.9010998
BROWN	25.266667	27.0677	227	15	14.001928
BRYANT WEB	26.066667	26.162138	362	15	14.945261
CARSON	19.419355	27.0677	228	15.5	11.120265
CHELTENHAM	23.391304	26.403497	357	23	20.376088
COLFAX	24.190476	27.0677	122	10.5	9.3838782
COLLEGE VIEW	23.363636	27.0677	99	11	9.4947114
COLUMBIAN	24.695652	27.0677	145	11.5	10.49221
COLUMBINE	27.326087	25.96937	278	11.5	12.322209
CORY	19.666666	27.0677	193	6	4.3594395
COWELL	26	27.0677	115	13	12.487208
CROFTON	22.933333	25.093234	315	7.5	6.3544372

```
THE NUMBER OF NEEDED TEACHERS IS  238.21827
THE DISTRICT AVERAGE MANAGEMENT INDEX NUMBER IS  243
THE DISTRICT PUPIL TEACHER AVERAGE IS 26.354684
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OLD:ELSTAFF502
>RUN
ELSTAFF502   08:17:52   30 OCT 75


 THIS PROGRAM CALCULATES A MANAGEMENT INDEX NUMBER FOR EACH SCHOOL

 AND INDICATES THE NUMBER OF TEACHERS REQUIRED FOR STAFFING PURPOSES


 TYPE THE TOTAL NUMBER OF PUPILS IN GRADES 1-6 FOR THE DISTRICT
? >32917
TYPE IN THE BASE CLASS SIZE FOR GRADES 1-6
? >27.0677
 TYPE IN THE TOTAL NUMBER OF TEACHING POSITIONS IN THE DISTRICT
 FOR GRADES 1-6
? >1249
 INDEX D IS BASED ON IMPACTION+MOBILITY+BUSING
 RANGE NUMBER 1 MUST BE USED FOR THIS PROGRAM


 TYPE IN THE NUMBER OF THE RANGE (1,2,3,4) YOU DESIRE TO USE
? >1
 TYPE IN THE NUMBER OF SCHOOLS INCLUDED IN THIS RUN
? >24
```

SCHOOL	PRESENT P/T RATIO	NEW P/T RATIO	MANAGEMENT INDEX	PRES NO. TCHR. POS.	NEW NO. TCHR POS.
DEL PUEBLO	26.818182	25.880074	275	11	11.398599
DENISON	19.111111	27.0677	223	9	6.3544372
DOULL	20.466666	27.0677	201	15	11.341931
EAGLETON	26	26.097376	275	14	13.947762
EBERT	22.272727	25.650747	398	11	9.5513786
EDISON	25.380952	25.759536	440	21	20.691366
ELLIS	18.818182	26.210855	430	22	15.794983
ELLSWORTH	25.333333	27.0677	137	6	5.6155491
ELYRIA	22.285714	27.0677	77	3.5	2.8816634
EMERSON	22.666666	25.383685	269	9	8.036658
FAIRMONT	24.625	25.327694	438	16	15.556094
FAIRVIEW	20.758621	24.83444	566	14.5	12.120265
FALLIS	23.111111	27.0677	106	9	7.6844357
FORCE	21.444444	26.150806	370	18	14.76054
FORD	21.653846	27.0677	166	26	20.799699
GARDEN PL	29.375	25.593735	332	8	9.1819345
GILPIN	28.75	26.045955	321	12	13.245819
GODSMAN	27.290323	27.0677	218	15.5	15.627482
GOLDRICK	23.48718	25.557271	471	19.5	17.920536
GREENLEE	22.1	25.50575	349	10	8.664713
GUNT	20.75	26.007514	387	16	12.765542
HALLETT	21.382353	26.11751	285	17	14.243318
HARRINGTON	27.941176	26.317843	315	17	18.048591
HOLM	26.916666	26.512262	418	24	24.366084

```
THE NUMBER OF NEEDED TEACHERS IS  310.59936
THE DISTRICT AVERAGE MANAGEMENT INDEX NUMBER IS  243
THE DISTRICT PUPIL TEACHER AVERAGE IS 26.354684
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*TIMEOUT WARNING*
OLD:ELSTAFF503
)RUN
ELSTAFF503   03:40:43   30 OCT 75


 THIS PROGRAM CALCULATES A MANAGEMENT INDEX NUMBER FOR EACH SCHOOL

 AND INDICATES THE NUMBER OF TEACHERS REQUIRED FOR STAFFING PURPOSES


 TYPE THE TOTAL NUMBER OF PUPILS IN GRADES 1-6 FOR THE DISTRICT
? 13291?
TYPE IN THE BASE CLASS SIZE FOR GRADES 1-6
? 27.0677
 TYPE IN THE TOTAL NUMBER OF TEACHING POSITIONS IN THE DISTRICT
 FOR GRADES 1-6
? 1249
 INDEX 0 IS BASED ON IMPACTION+MOBILITY+BUSING
 RANGE NUMBER 1 MUST BE USED FOR THIS PROGRAM

 TYPE IN THE NUMBER OF THE RANGE (1,2,3,4) YOU DESIRE TO USE
? 1
 TYPE IN THE NUMBER OF SCHOOLS INCLUDED IN THIS RUN
? 24
```

SCHOOL	PRESENT P/T RATIO	NEW P/T RATIO	MANAGEMENT INDEX	PRES NO. TCHR. POS.	NEW NO. TCHR POS.
JOHNSON	19.692307	27.0677	185	13	9.457767
KAISER	22.464286	25.42644	653	28	24.73803
KNAPP	28.166666	27.0677	201	18	18.730812
KNIGHT	42.125	26.022636	256	8	12.950264
LINCOLN	26	25.985592	329	12.5	12.506931
MCKINLEY	20.333333	27.0677	25	6	4.507217
MCMEEN	23.105263	26.258191	269	19	16.718593
MITCHELL	22.65	24.841227	643	20	18.235814
MONTBELLO	27	27.0677	166	7	6.982492
MONT VOAK)	56.4	26.433399	321	10	21.336643
MONTCLAIR	25.388889	25.55415	470	18	17.883592
MOORE	32.666666	26.340181	364	15	18.602757
MUNROE	25.285714	27.0677	198	14	13.078318
NEWLON	26.263158	27.0677	113	19	18.435257
PALMER	25.826087	25.888021	261	11.5	11.472487
PARK HILL	25.607143	27.0677	209	28	26.489136
PHILIPS	29.923077	27.0677	78	13	14.371372
PITTS	22.538461	27.0677	190	13	10.82471
REMINGTON	23.153846	25.903023	281	13	11.620265
RODEDALE	22	25.634112	278	11	9.4405453
SABIN	23.384615	25.914027	477	26	23.462196
SAMUELS	29.5	26.616295	275	28	29.981633
SCHENCK	29.481481	27.0677	224	13.5	14.703872
SCHMITT	27.17647	27.0677	113	17	17.068314

```
THE NUMBER OF NEEDED TEACHERS IS  383.599
THE DISTRICT AVERAGE MANAGEMENT INDEX NUMBER IS  243
THE DISTRICT PUPIL TEACHER AVERAGE IS 26.354684
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>OLD:ELSTAFF504
>RUN
ELSTAFF504   08:50:49   30 OCT 75


 THIS PROGRAM CALCULATES A MANAGEMENT INDEX NUMBER FOR EACH SCHOOL

 AND INDICATES THE NUMBER OF TEACHERS REQUIRED FOR STAFFING PURPOSES


 TYPE THE TOTAL NUMBER OF PUPILS IN GRADES 1-6 FOR THE DISTRICT
? >32917
TYPE IN THE GRADE CLASS SIZE FOR GRADES 1-6
? >27.0677
 TYPE IN THE TOTAL NUMBER OF TEACHING POSITIONS IN THE DISTRICT
 FOR GRADES 1-6
? >1249
 INDEX D IS BASED ON IMPACTION + MOBILITY + BUSING
 RANGE NUMBER 1 MUST BE USED FOR THIS PROGRAM


 TYPE IN THE NUMBER OF THE RANGE (1,2,3,4) YOU DESIRE TO USE
? >1
 TYPE IN THE NUMBER OF SCHOOLS INCLUDED IN THIS RUN
? >21
                PRESENT      NEW        MANAGEMENT PREV NO.   NEW NO.
   SCHOOL     P/T RATIO   P/T RATIO      INDEX   TCHR. POS. TCHR POS.
-------------------------------------------------------------------------

SHERMAN       27.166666   27.0677     72          6           6.0219375

SLAVENS       27.777778   26.354348   391.        18          18.972201

SMEDLEY       28.266667   26.230438   335         15          16.164426

SMITH         22.416666   25.771111   576         24          20.876088

STECK         25.181818   27.0677     176         11          10.2336
STEDMAN       25.2        25.688101   264         10          9.8099393

STEELE        17.571428   27.0677     144         7           4.5441615
STEVENS       22.6        27.0677     171         7.5         6.3174928

SWANSEA       26.051282   26.365291   256         19.5        19.267756

TELLER        24.583333   27.0677     171         12          10.898599

THATCHER      27.5        27.0677     109         4           4.0638843

TRAYLOR       20.227273   26.268783   387         22          16.940259

UNIV. PARK    21          26.019646   264         16          12.91332
VALDEZ        24.421052   26.300571   328         19          17.642203

VALVERDE      23.827586   27.0677     223         14.5        15.44276
WASH. PARK    18.25       27.0677     140         12          8.0908241

WESTWOOD      24.066667   27.0677     173         15          13.33693
WHITEMAN      27.6875     26.265284   372         16          16.86637
WHITTIER      23.333333   25.428837   265         9           8.2583245

WYATT         21.565217   25.667001   336         11.5        9.6622118

WYMAN         30.376812   25.738171   436         17.25       20.353367

THE NUMBER OF NEEDED TEACHERS IS  266.68219
THE DISTRICT AVERAGE MANAGEMENT INDEX NUMBER IS  243   Total 1249.09
THE DISTRICT PUPIL TEACHER AVERAGE IS 26.354684

TIME :    .666
```

APPENDIX J

DENVER PUBLIC SCHOOLS
Division of Education
Department of Elementary Education

STAFFING PROCEDURE
October 1975

1. As you know, staff allocation is based on the following four variables: mobility; enrollment; busing; and economic impaction. The application of these variables affects the quantative allocation of staff as related to a fixed class size index. Does the application of these variables appear to you to form the basis for a fair and equitable staffing procedure?

   Yes _____ No _____

   Comment:

2. It was planned at the outset of this project to implement this staffing procedure in February of 1976 and make necessary final staffing adjustments in September of 1976. Does this follow the design of the original time line?

   Yes _____ No _____

   Comment:

3. This plan has a class size index for all schools. Variation from this figure would be additional staff and is not designed to be a reduction from the base. Does this seem the logical procedure to pursue?

Yes _____ No _____

Comment:

4. For the purpose of this basic allocation we did not include physical education, special education, teacher assistant, counselor, PPA and IMC teachers or any federally funded personnel. However, this is not intended to alter our previous method of total staff accountability as it relates to the staffing of a school. These are calculated into staff allocations after application of the formula. Does this fit in with your thinking?

Yes _____ No _____

Comment:

DENVER PUBLIC SCHOOLS
Division of Education
Department of Elementary Education

OCTOBER 1975

SURVEY OF PRINCIPALS ON THE PROPOSED STAFFING PROCEDURE

Twelve (12) elementary school principals volunteered to serve as a study committee to assist in the development of a computerized staffing procedure. Questionnaires were distributed to committee members at the end of the initial planning phase. Completed surveys were received from nine (9) principals, a 75.0 percent response. A complete analysis follows.

	Yes		No	
As you know, staff allocation is based on the following four variables: mobility; enrollment; busing; and economic impaction. The application of these variables affects the quantative allocation of staff as related to a fixed class size index. Does the application of these variables appear to you to form the basis for a fair and equitable staffing procedure?	N	%	N	%
	9	100.0%	-	0.0%

Comments:

Allocations seem to be the key; this base seems to be a fair accommodation to the vagaries in the traditional allocation process.

	Yes		No	
It was planned at the outset of this project to implement this staffing procedure in February 1976 and make necessary final staffing adjustments in September of 1976. Does this follow the design of the original time line?	N	%	N	%
	9	100.0%	-	0.0%

Comments:

It would be helpful to wait until final court orders are received.

This plan has a class size index for all schools. Variation from this figure would be additional staff and is not designed to be a reduction from the base. Does this seem the logical procedure to pursue?	Yes		No	
	N	%	N	%
	9	100.0%	-	0.0%

Comments:

It is important to keep in mind the paired schools; there are variances in the communities and in parental interest.

For the purpose of this basic allocation we did not include physical education, special education, teacher assistant, counselor, PPA and IMC teachers or any federally funded personnel. However, this is not intended to alter our previous method of total staff accountability as it relates to the staffing of a school. These are calculated into staff allocations after application of the formula. Does this fit in with you thinking?	Yes		No		Neither	
	N	%	N	%	N	%
	8	88.9%	-	0.0%	1	11.1%

Comments: (Multiple responses are indicated in parentheses)

- IMC should be included with art and music (3)
- IMC should be included
- Be sure to consider the total school operation
- This must be watched carefully
- Before I could fairly vote yes, I feel some application should be made on the basis of a formula that would provide equitable coverage beyond the base.

SUMMARY

The principals responding have almost totally supported the process of staffing schools using the computerized formula. The support from principals is generated because the process appears to demonstrate that schools will be staffed equitably, with consideration given to individual school educational needs.

SUMMARY (continued)

The survey found that several principals want further attention to be given to the staffing of special subject areas in DMC, music, and art. According to the principals, this process in the appropriate initial step in the staffing of schools. It is now apparent that the practitioner will have the needed access and support of principals to move to the next logical step in the total staffing of each school and provide a basis for staffing the special subject areas of art, music, and DMC.

FER:ODT/cbr